U.S. FISH AND WILDLIFE SERVICE
NEW ENGLAND FIELD OFFICE
SPECIAL PROJECT REPORT: FY98-MEFO-1-EC

ENVIRONMENTAL CONTAMINANTS IN FISH AND MUSSELS FROM MEDDYBEMPS LAKE, THE DENNYS RIVER, AND EAST MACHIAS RIVER

EASTERN SURPLUS SUPERFUND SITE
MEDDYBEMPS, MAINE

November 1998

MISSION

U.S. FISH AND WILDLIFE SERVICE

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EASTERN SURPLUS SUPERFUND SITE MEDDYBEMPS, MAINE

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November 1998

EXECUTIVE SUMMARY

From 1946 to the early 1980s, the 3-acre Eastern Surplus Superfund Site in Meddybemps, Maine, was used for the disposal and storage of surplus military equipment and salvage items. During a 1984 site inspection, the Maine Department of Environmental Protection encountered leaking electrical transformers, numerous drums, gas cylinders, and other containers, and areas of stained soil. The Eastern Surplus Site is adjacent to Meddybemps Lake and the Dennys River - two areas popular with boaters and anglers, and important waters for trust resources of the U.S. Department of the Interior and the State of Maine. Meddybemps Lake is used by a federally-listed threatened species, the bald eagle, and portions of the lake form the border of a National Wildlife Refuge. The Dennys River is a regionally-important river for Atlantic salmon, a species of management concern to the U.S. Fish and Wildlife Service. Consequently, contaminants associated with the Eastern Surplus Site have been a concern to the residents of Meddybemps and to state and federal fish and wildlife agencies. In 1997, at the request of the Environmental Protection Agency, the U.S. Fish and Wildlife Service conducted a screening-level contaminant survey of fish and mussels of Meddybemps Lake, the Dennys River, and the East Machias River.

The purposes of this survey were to determine if PCBs and other environmental contaminants were accumulating in aquatic biota, and to provide baseline data for human health and ecological risk assessments.

Between September 22 and 27, 1997, seventy-one fish were collected from 3 locations in Meddybemps Lake, 3 reaches of the Dennys River, and from several areas within the East Machias River. Thirty mussels in 5 mussel composites were collected in the same 3 Meddybemps Lake locations as fish, from two Dennys River locations (below the Meddybemps Lake dam, below the Rt. 191 bridge) and in 1 location in the East Machias River (at the bridge in Jacksonville on Rt. 191). In this study, the East Machias River served as a reference area for the Dennys River. A northern cove of Meddybemps Lake, Staples Cove - 5 miles from the Eastern Surplus Site, served as a lake reference area.

Thirty-one smallmouth bass (*Micropterus dolomieu*), 5 brook trout (*Salvelinus fontinalis*), 15 pumpkinseed (*Lepomis gibbosus*), 20 white sucker (*Catostomus commersoni*), 15 eastern elliptio (*Elliptio complanata*), and 15 alewife floater (*Anodonta implicata*) were collected and submitted for analyses of trace metals, organochlorines, congener-specific PCBs, and PCB homologs (mono through deca). Smallmouth bass and brook trout were submitted as fillet and carcass samples (body minus fillet). Pumpkinseed and white sucker were submitted wholebody. One mussel sample (5 mussel composite, same species) was submitted for each of the mussel collection locations (n = 6). Contaminant analyses were performed by Texas A&M University's Geochemical and Environmental Research Group under the direction of the USFWS Patuxent Analytical Control Facility.

Meddybemps Lake Results

Trace Elements

Compared to national, regional, and other Maine contaminant studies, highly elevated levels of trace elements were not detected in tissues of surveyed Meddybemps Lake fish (smallmouth bass, pumpkinseed) and freshwater mussel (eastern elliptio, alewife floater).

Comparisons of trace element concentrations in fish tissue among the three Meddybemps Lake sampling locations do not suggest major site-related impacts to fish or mussels from the Eastern Surplus Superfund Site. Some site-specific statistically significant ($p < 0.05$) differences in fish tissue were found for copper, zinc, and mercury.

- Copper in smallmouth bass fillets and reconstructed wholebody bass, and zinc in reconstructed wholebody bass were significantly higher at the Eastern Surplus Site than in bass from Staples Cove or Fowler Point.

- Mercury in bass fillets was significantly higher in Staples Cove, the lake reference area, than in bass collected near the Eastern Surplus Site or at Fowler Point.

Freshwater mussel composite samples from Meddybemps Lake tended to have higher trace element concentrations than fish. The mussel composite sample collected along the Eastern Surplus shoreline did not have markedly different trace element concentrations than the samples collected at Fowler Point or Staples Cove.

Polychlorinated Biphenyls (PCBs) and Organochlorine Pesticides

Compared to national, regional, and other Maine contaminant studies, highly elevated levels of PCBs and organochlorine pesticides were not detected in Meddybemps Lake fish or mussel tissue.

- Smallmouth bass fillet samples and reconstructed wholebody bass collected near the Eastern Surplus Superfund Site had significantly higher PCB concentrations ($p < 0.05$) than bass taken from Fowler Point and Staples Cove. Although significantly different, the levels were not highly elevated. The highest smallmouth bass reconstructed wholebody PCB concentration was 0.13 ppm (parts-per-million), while the highest bass fillet had only 0.03 ppm.

- Organochlorine pesticides, in general, were rarely detected in Meddybemps Lake smallmouth bass tissue samples. The most commonly detected organochlorine pesticide was p,p'- DDE. Organochlorine pesticides were not detected in Meddybemps Lake wholebody pumpkinseed or in freshwater mussel composite samples.

< Low levels of endosulfan were detected in smallmouth bass collected near the Eastern Surplus Site. This contaminant was not detected in bass collected from Staples Cove or Fowler Point or in wholebody pumpkinseed from any of the three Meddybemps Lake collection locations.

Dennys River and East Machias River Results

Trace Elements

Compared to national, regional, and other Maine contaminant studies, highly elevated levels of trace elements were not detected in tissues of three species of fish (smallmouth bass, brook trout, white sucker) and one species of freshwater mussel (alewife floater) from the Dennys River. Trace element levels were not highly elevated in fish (smallmouth bass, white sucker) or mussels (eastern elliptio) collected from the East Machias River, the reference river for this study.

Comparisons of trace element concentrations in tissue samples from three Dennys River and two East Machias River fish collection locations do not suggest major site-related impacts to fish or mussels from the Eastern Surplus Superfund Site. Composite mussel sample concentrations also do not suggest site-related impacts. Some site-specific statistically significant ($p < 0.05$) differences in riverine fish tissue were found for selenium and cadmium.

< Selenium was significantly higher in reconstructed wholebody bass from the East Machias River than bass from the Dennys River.

< Wholebody white sucker from the East Machias River reference area had significantly higher levels of cadmium than suckers taken from the Dennys River.

< Compared to the other sampling locations, chromium appears to be higher in the fillets of Dennys River smallmouth bass collected adjacent to the Eastern Surplus Site. However, the sample data at that particular location are highly variable.

Polychlorinated Biphenyls (PCBs) and Organochlorine Pesticides

Compared to national, regional, and other Maine contaminant studies, highly elevated levels of PCBs and organochlorine pesticides were not detected in fish or mussels from the Dennys River and East Machias River.

< Reconstructed wholebody smallmouth bass from the deadwater reach of the Dennys River had significantly higher ($p < 0.05$) concentrations of PCBs than bass from the East Machias River.

< The highest reconstructed wholebody PCB concentration in the study, 0.26 ppm, was found in

a 15.5 inch smallmouth bass from the Dennys River deadwater reach.

< PCB concentrations were significantly higher ($p < 0.05$) in wholebody white sucker from the Dennys River than suckers from the East Machias River. Although statistically higher than the East Machias River, the mean PCB concentration in wholebody white sucker from the Dennys River was only 0.05 ppm.

< Low levels of endosulfan were detected in Dennys River bass collected adjacent to the Eastern Surplus Site and in the downstream deadwater reach. This contaminant was not detected in white suckers from the Dennys River or in bass or suckers from the East Machias River.

< Brook trout from the Dead Stream/Dennys River confluence appeared to have higher concentrations of dieldrin and DDT metabolites than smallmouth bass collected from the Dennys River adjacent to the Eastern Surplus Site, in the Dennys River deadwater reach, or from the East Machias River near Hadley Lake.

< Organochlorine pesticides were not detected in composite mussel tissue samples from the Dennys River or East Machias River.

PREFACE

This report includes the field and analytical results of a screening-level contaminant survey of Meddybemps Lake, the Dennys River, and East Machias River. Funding for this study was provided by Region 1 of the U.S. Environmental Protection Agency (EPA) under an interagency agreement between the U.S. Fish and Wildlife Service (USFWS) and EPA for technical assistance in the Superfund Program (EPA/IAG #DW14934248-01-F). The USFWS analytical catalog for this project was #5030058 and the purchase order numbers were1448-92223-98-Y160 (organochlorines and PCB congeners), Y160A (PCB homologs), and Y161 (trace elements).

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Appendix D. Non-*ortho* and Mono-*ortho* Planar PCB Congeners, Tables D-1 through D-10.

Appendix E. Di-*ortho* Planar PCB Congeners, Tables E-1 through E-10.

Appendix F. ECDMS Analytical Report - Trace elements. Geochemical and Environmental Research Group, Texas A&M. Purchase Order 92223-98-Y161. USFWS Patuxent Analytical Research Facility Catalog Number 5030058. 77 pages.

Appendix G. ECDMS Analytical Report - PCB Homologs. Geochemical and Environmental Research Group, Texas A&M. Purchase Order 92223-98-Y160A. USFWS Patuxent Analytical Research Facility Catalog Number 5030058. 40 pages.

Appendix H. ECDMS Analytical Report - Organochlorines and PCB Congeners. Geochemical and Environmental Research Group, Texas A&M. Purchase Order 92223-98-Y160. USFWS Patuxent Analytical Research Facility Catalog Number 5030058. 362 pages.

Appendix I. Raw laboratory data - Microsoft Excel 97 ® files
Trace Elements - “elem.xls”
Organochlorines & PCB congeners - “oc.xls”
PCB homologs - “pcbhom.xls”

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Note: Appendices F through H were only provided to the U.S. Environmental Protection Agency and Maine Department of Environmental Protection. Electronic versions of these appendices and Appendix I are available from the Maine Field Office of the U.S. Fish and Wildlife Service upon request.

1.0 Introduction

From 1946 to the early 1980s, the 3-acre Eastern Surplus Superfund Site in Meddybemps, Maine, was used for the disposal and storage of surplus military equipment and salvage items. During a 1984 site inspection, the Maine Department of Environmental Protection (DEP) encountered leaking electrical transformers, numerous drums, gas cylinders, and other containers, and areas of stained soil. Subsequent sampling of soils at the site by the Maine DEP and the Environmental Protection Agency (EPA) revealed that the contaminants of concern at the site included polychlorinated biphenyls (PCBs), trace elements such as chromium and lead, and solvents. Of these contaminants, PCBs are a particularly serious group because they readily accumulate in biota and magnify in concentration at each level up the food chain.

The location of the Eastern Surplus Site in relation to sensitive habitats also raises concerns. The Eastern Surplus Site is adjacent to Meddybemps Lake and the Dennys River - two areas popular with boaters and anglers, and important waters for fish and wildlife resources. The species supported by these waters include some of the most intensively managed species in the State of Maine. For example, a federally-listed threatened species, the bald eagle (*Haliaeetus leucocephalus*), regularly forages on fish from Meddybemps Lake. A bald eagle nest on Bald Mountain is less than 3-km (5 mi) from the lake. Osprey (*Pandion haliaetus*), another highly visible piscivorous raptor species, also forage on lake fish, with a pair of birds annually maintaining a nest on Long Point in the southern portion of the lake. The Dennys River is a regionally-important river for Atlantic salmon (*Salmo salar*), an anadromous fish species of management concern to state and federal fish and wildlife agencies. Other migratory fish in the river that could be potentially affected by contaminants from the Eastern Surplus Site include rainbow smelt (*Osmerus mordax*), American eel (*Anguilla rostrata)*, alewife (*Alosa pseudoharengus*), and American shad (*Alosa sapidissima*). Finally, aquatic invertebrate species, specifically freshwater mussels, were also considered potentially at risk from Site contaminants. The brook floater (*Alasmidonta varicosa*), a freshwater mussel that is a Special Concern species in Maine, has been found in the Dennys River.

Due to the types of contaminants involved, the close proximity of the Eastern Surplus Site to sensitive environments, and the presence of federally-listed threatened species, the site was added to the National Priority List of Superfund Sites in 1996. Residents of the town of Meddybemps and Washington County, and staff from state and federal fish and wildlife agencies and environmental protection departments have been concerned that contaminants associated with the Eastern Surplus Site may be affecting fish and wildlife resources of the area. In 1997, the Environmental Protection Agency responded to these concerns and provided funding to the U.S. Fish and Wildlife Service to conduct a screening-level contaminant survey of the fish and mussels of Meddybemps Lake, the Dennys River, and the East Machias River.

2.0 Study Purposes

< To determine if PCBs and other environmental contaminants associated with the Eastern Surplus Superfund Site are accumulating in fish and mussels of the Dennys River and Meddybemps Lake, and to compare those levels with national, regional, or state data.

< To provide the Environmental Protection Agency and Maine Department of Environmental Protection with site-specific data for human and ecological risk assessments of the Eastern Surplus Superfund Site.

3.0 Study Area

The focus waters of this study are Meddybemps Lake and the Dennys River, particularly the sections of the lake and river that abut the Eastern Surplus Superfund site in the Town of Meddybemps, Washington County, Maine (Figure 1). A section of the East Machias River in the Town of East Machias and Township T18ED/BPP is included in the study as a reference area for the Dennys River.

3.1 Meddybemps Lake

Meddybemps Lake is located within the boundaries of the towns of Meddybemps, Baring, Woodland (Baileyville), and Alexander. Frontage along the southeastern shore of the lake is part of the Moosehorn National Wildlife Refuge which is managed by the U.S. Fish and Wildlife Service. The lake has an area of approximately 2,740 hectares (6,765 acre) and a maximum depth of 11 meters (38 feet, Maine IF&W 1953). The lake has an irregular shoreline and rocky bottom.

Smallmouth bass (*Micropterus dolomieu*) and pumpkinseed (*Lepomis gibbosus*) were collected from Staples Cove, Fowler Point, and adjacent to the Eastern Surplus Site (Figure 2). Two species of freshwater mussels were also collected for contaminant analysis. Eastern elliptio (*Elliptio complanata*) were sampled at Staples Cove and Fowler Point, and alewife floater (*Anodonta implicata*) were taken from the shoreline at the Eastern Surplus Site. Staples Cove (also known locally as Bear Cove), 8 kilometers (5 miles) north of the Eastern Surplus Site, served as the lake reference area. Fowler Point was included in the study at the request of the Environmental Protection Agency because fish and mussels from the area are consumed by local residents.

3.2 Dennys River

The 32-km-long (20 mi) Dennys River has a drainage area of 34,188 ha (84,415 ac, USFWS and NMFS 1995) and originates at Meddybemps Lake. The study reach of the Dennys River for this project began at the lake outlet near State Route 191 and continued to the confluence with Dead Stream, a distance of approximately 6-km (4 mi). Most of this section of the river is deadwater with a mud and sand bottom. The 0.4-km (0.25 mi) reach of the river immediately adjacent to the Eastern Surplus Site has a steeper gradient and a cobble and boulder substrate. It provides the only Atlantic salmon spawning habitat in the upper section of the river above Gilman Falls (Fletcher 1960).

White sucker (*Catostomus commersoni*) and smallmouth bass or brook trout (*Salvelinus fontinalis*) were collected from three Dennys River locations - below the Meddybemps Lake dam adjacent to the Eastern Surplus Site, in the deadwater reach above Cousins Camp, and at the confluence with Dead Stream (Figure 3). Alewife floater samples were collected below the dam and below the Route 191 bridge in Meddybemps.

3.3 East Machias River

The East Machias River in the Town of East Machias and the Township T18ED/BPP was sampled as a reference area to the Dennys River. No state- or federally-listed hazardous waste sites are known to exist on the river. The 60-km (37 mi) East Machias River has a drainage of 65,009 ha (160,516 ac), contains 26 lakes and ponds, and over 50 tributaries (USFWS and NMFS 1995). The river originates at Pocomoonshine Lake.

In our study, several sections of the East Machias River were fished between September 24 and 26, 1997. Due to low water levels, collections were difficult in the river and several areas were fished to obtain the required number of fish samples. White sucker were collected above Second Lake and in the river reach above Hadley Lake. Smallmouth bass were collected from the reach immediately below Hadley Lake and in the stretch below the State Route 191 bridge in Jacksonville (Figure 4). A mussel composite sample of eastern elliptio was taken in the riffle area above the Route 191 bridge.

4.0 Methods

Fish and mussels were collected from Meddybemps Lake, the Dennys River, and the East Machias River between September 22 and 27, 1997. Fish were collected using electrofishing boats, backpack electroshockers, 38-m (125 ft) experimental gill nets, fyke nets, and angling. Freshwater mussels were located by wading with underwater viewing buckets. Mussels were collected by hand, scrubbed in ambient water, and shucked.

All fish and mussel samples were coded by location, number, species, and type.

Sample Codes

Location:	SC - Staples Cove FP - Fowler Point MS - Meddybemps Lake near the Eastern Surplus Site ES - Dennys River near the Eastern Surplus Site DW - Dennys River deadwater DS - Dennys River at the confluence with Dead Stream EM - East Machias River		
Sample #:	01 through 10		
Fish Species:	SM - smallmouth bass BT - brook trout PS - pumpkinseed WS - white sucker	Mussel Species:	AF - alewife floater EC - eastern elliptio

For example, a sample labeled SC01SMF is: from Staples Cove, sample #01, and a smallmouth bass fillet, while SC01SMC is the carcass sample of that fish. Mussels were labeled similarly, but sample type was not listed and the Dennys River location codes were ES01 (adjacent to the Eastern Surplus Site) and ES02 (below the Route 191 bridge in Meddybemps).

The maximum total length in centimeters was measured for each fish. All fish were weighed to the nearest gram. Prior to processing, each fish was examined for external abnormalities and scales were removed for aging. Ages were estimated from scale annuli examinations (Smithwood 1997). Smallmouth bass and brook trout were filleted in the field. The entire skin was removed from smallmouth bass fillets. Brook trout fillets were skin-on samples. The head, tail, fins, and viscera were removed from each trout, and the midsection of the body (skin-on), was the fillet sample. This was done for two reasons: 1) many anglers in Maine frequently cook and consume small trout skin-on, and 2) the fish were too small (approximately 20-cm or 8-in) to obtain skinless fillets with the required minimum analytical weight. Carcasses of bass (including the skin from fillets) and trout were packaged as separate samples. White sucker and pumpkinseed were measured, weighed, and packaged wholebody. Fish tissue samples were wrapped in aluminum foil (dull side towards sample), labeled, and placed in plastic freezer bags. Samples were immediately placed in a freezer and stored frozen until shipped to the analytical laboratory.

Mussel measurements included length, width, breadth, total weight, and tissue weight (shucked sample). Shell length, width, and breadth were measured with dial calipers in millimeters. Total weight and tissue weight were measured to the nearest gram. Five mussels of the same species and of similar size were composited for each collection location. Tissue composites were placed in chemical-clean glass jars with teflon lids, labeled, and frozen.

Latitude and longitude coordinates of most fish net and mussel sampling locations were recorded with a Rockwell Precision Lightweight GPS Receiver (Table 2). Some collection location coordinates were estimated from geographic information systems databases. Electrofishing in Meddybemps Lake or the rivers ranged over wide areas and GPS coordinates were not recorded.

5.0 Results

5.1 Chemical analyses

Fish and mussel tissue samples (n=113) were analyzed for organochlorine pesticides and total PCBs, PCB congeners, PCB homologs, trace metals, percent moisture, and percent lipid. Table 7 lists the contaminants included in the analyses. All contaminant analyses were performed by the Geochemical and Environmental Research Group (GERG) at Texas A&M University under the direction of the USFWS's Patuxent Analytical Control Facility. Most metal concentrations were determined by graphite furnace atomic absorption spectrometry (AAS) or, in the case of mercury, by cold vapor AAS. Pesticide and PCB analyses were performed by capillary gas chromatography (CGC). Total PCBs were reported in the organochlorine scan. Total PCBs can also be derived by summing the detections in the homologs and congener analyses. Since detection limits are lowest in the congener scan, the sum of congener detections was used in this report to represent the Total PCB concentration. Analytical methods of GERG are included in pages 74 - 76 of Appendix F (trace elements), pages 37 - 39 of Appendix G (PCB homologs), and page 357 - 361 of Appendix H .

5.2 QA/QC

Quality assurance and quality control were accomplished through instrument calibration verification, replicate analyses, spike recoveries, and analysis of standard reference material. Contract laboratory results were reviewed by the USFWS's Patuxent Analytical Control Facility (PACF) and deemed acceptable. QA/QC comments are included in pages 72-73 of Appendix F (trace elements), pages 35-36 of Appendix G (PCB homologs) and page 355 of Appendix H (organochlorines and PCBs).

Problems that are typical in congener-specific PCB analyses and of near limit of detection analyses were present in the data set. The following specific anomalies associated with the congener analyses (Appendix H) were reported by PACF (Moore, J. 1998. Personal communication):

- Measurable quantities of certain congeners were present in several procedural blanks (QA/QC notes: 74-106). It is generally not known whether these are actual PCB congeners or co-eluting interferences. In any case, data that are not significantly higher than the blank concentrations are questionable.

- Several duplicate analysis relative percent differences were high (QA/QC notes:107-185). This lack of duplication is often seen in low level analyses. It is very difficult if not impossible to homogenize a fish sample to the degree that each of 120 very low level compounds is equally

represented in two aliquots. The duplicate anomalies reported are generally insignificant.

- Several spike recoveries were outside the normal range established by PACF (QA/QC notes: 186-209). The reported recoveries are generally only slightly outside the normal range. The spike level, at about 0.007 ppm, is quite low. When the low spike level is considered in light of the homogeneity issues discussed above, some spike anomalies should be expected. Most are insignificant. The recoveries of PCB #18, PCB #201, and PCB #8 are unacceptable and results for these congeners should not be used.

5.3 Data Analyses

5.3.1 Presentations

Data from the analytical laboratory were reported in micrograms per gram (: g/g, parts-per-million). Data tables in the main body of this report and in Appendices A through E present contaminant concentrations in the same units, : g/g. Detection limits and relative quantities vary considerably by contaminant group and we attempted to remain consistent and not express values in parts-per-billion (ppb, nanogram per gram - ng/g) or parts-per-trillion (ppt, picogram per gram - pg/g). However, the use of microgram per gram (: g/g) in the reporting or discussing of non-*ortho* PCB congeners (i.e., #77, #126, #169) would have been cumbersome. We use the units picogram per gram (pg/g or parts-per-trillion) to describe non-*ortho* PCB congener concentrations. In the remainder of the report, the same units (ppm, : g/g) are used for each contaminant group, but different numbers of decimal places are used to express values for trace elements (n = 2, 0.01), organochlorines (n = 3, 0.001), PCB homologs (n=4, 0.0001), and PCB congeners (n $ 6, 0.000001). All tissue concentrations are expressed on a wet weight basis.

The total PCB (GPCB) concentrations used throughout this report are the sum of congener-specific analyses. The only exception is the sum of PCBs for homolog profiles (Appendix C). A slightly different analytical process is used to quantify homologs concentrations. Consequently, small differences, in part because of low concentrations of some congeners, exist between the homolog PCB sum and congener-specific PCB sum for some samples.

Concentrations of non-*ortho*, mono-*ortho*, and di-*ortho* PCB congeners (as categorized by Eisler and Belisle 1996:11) are presented in Tables D and E. If a congener within these groups was not detected in any sample, the congener is not listed in the tables. PCB #15 and #18 are included in Appendix D as non-*ortho* congeners - consistent with the categorization with Eisler and Belisle (1996). However, relatively little information regarding these two non-*ortho* congeners in biota is currently available and only the most toxic co-planar non-*ortho* PCB congeners (e.g., PCB #77, #126, and #169) are summarized in the report.

5.3.2 Statistics

Statistical analyses were performed with SYSTAT® 7.0 (SPSS 1997). Descriptive statistics in this report include arithmetic mean, standard deviation, and range. Data distributions were examined with probability plots and the Kolmogorov-Smirnov test (Lilliefors Option) within SYSTAT. Length and, to a lesser extent, total weight of fish were normally distributed and site comparisons were made through analysis of variance (ANOVA). In most instances, location-specific, species-specific fish tissue contaminant data were not normally distributed and sample sizes were small. Consequently, a non-parametric statistical test (Kruskal-Wallis analysis of variance of ranks) was used to detect significant differences among lake or river collections sites in species-specific fillet, reconstructed wholebody, or wholebody contaminant levels. Contaminant concentrations within sample types, with a few exceptions, were not significantly different ($\alpha = 0.05$) among locations.

Certain contaminants were not frequently detected in fish or mussel tissue. This is not unusual. In most contaminant investigations, non-detects are common elements in data sets. In this study, when contaminant levels were particularly low, and when half or more of the samples from a site contained non-detects for a particular contaminant, a mean was not computed. If a sample with a non-detect was included in the calculation of a mean (i.e., half or more of the sample had detectable amounts), one-half the sample detection limit was used.

5.3.3 Wholebody Reconstruction

Upper trophic level piscivores usually consume the entire fish. To evaluate the potential hazards to piscivorous wildlife posed by environmental contaminants in whole fish, and to facilitate comparisons with other fish tissue studies, we combined fillet and carcass information for smallmouth bass and brook trout to generate "reconstructed" wholebody concentrations for these species. The wholebody reconstruction formula is:

$$RWC = (FB + CB)/TW$$

where RWC is the reconstructed wholebody concentration
FB is the fillet burden (i.e., fillet weight * fillet concentration),
CB is the carcass burden (i.e., carcass weight * carcass concentration), and
TW is the combined weight of the fillet and carcass.

This wholebody reconstruction method is similar to the approach used by Madenjian et al. (1998). Not all fish were "reconstructed." If a trace element or organochlorine contaminant was infrequently detected in a sample group, wholebody reconstruction calculations were not performed and only the carcass concentration is presented. Although nearly 70 PCB congeners were detected in fish samples, wholebody reconstruction concentrations were not calculated for every congener. We calculated the reconstructed wholebody concentrations for 21 congeners. These included the congeners within the non-*ortho*, mono-*ortho*, and di-*ortho* groups (Appendices D and E). For the remaining congeners, only the carcass concentrations are mentioned.

5.4 Sample Metrics

5.4.1 Lengths and weights

For each species, five fish of similar-length were collected at each location. Smallmouth bass collected from the Dennys River deadwater were significantly longer (ANOVA, $p = 0.029$) than bass from other river or lake collection locations. However, the mean total weights of bass were not significantly different among locations. Pumpkinseed from Staples Cove, Fowler Point, and near the Eastern Surplus Site in Meddybemps Lake were not significantly different in length or weight. White sucker collected from the Dennys River and East Machias River were also similar in length and weight.

5.4.2 Ages

All fish kept for contaminant analysis in this study were aged by USFWS personnel (Smithwood 1997) utilizing the scale annuli method. Smallmouth bass in this study ranged in age from 3 to 7 years. Bass from Meddybemps Lake were either 4 ($n = 7$) or 5 years old ($n = 8$), while fish from the Dennys River ranged from 4 to 7 years. Bass from the East Machias River were younger than Dennys River bass being either 3 ($n = 2$) or 4 years of age ($n = 4$). All brook trout ($n = 5$) collected from the Dennys River/Dead Stream confluence were estimated to be 2 years of age. White sucker collected from the Dennys and East Machias Rivers were 1 to 2 years old. Pumpkinseed from Meddybemps Lake ranged in age from 4 to 7 years.

5.4.3 Lipid content

Lipid values for smallmouth bass and brook trout fillet and carcass samples, pumpkinseed and white sucker wholebody samples, and mussel composite samples are included in Appendices H and I. Since bass and trout were analyzed as fillet and carcass samples, total lipid content in wholebody fish was determined with the same reconstruction formula described in Section 5.3.3; substituting lipid content for carcass or fillet concentration.

The average lipid content in Meddybemps Lake smallmouth bass (reconstructed wholebody) was 3.9% at the Eastern Surplus Site, 2.5 % at Staples Cove, and 2.6% at Fowler Point. In pumpkinseed from the lake, lipid content was highest in fish from Fowler Point (5.1%). Lipid content in pumpkinseed from the Eastern Surplus Site was 3.9%, while fish from Staples Cove had a slightly smaller amount, 3.4%. In river fish, smallmouth bass (reconstructed wholebody) lipid content was 2.0% in fish collected from the Dennys River adjacent to the Eastern Surplus Site, 3.0% in bass from the Dennys River deadwater, and 2.9% in bass from the East Machias River. Brook trout from the confluence of Dead Stream and Dennys River had a mean lipid content of 3.2%. Wholebody white sucker had a lower lipid content than bass or trout. In the Dennys River, white sucker lipid percentages were 0.94% (Eastern Surplus Site), 0.66% (deadwater), and 1.3% (Dead Stream confluence). Lipid content in wholebody white sucker from the East Machias River was higher (0 2.5%, range: 1.9 to 3.7%) than

suckers from the Dennys River. Lipid content in mussel composite samples ranged from 0.2% to 0.5%.

5.5 Meddybemps Lake Analytical Results

5.5.1 Trace Elements - Lake Sites

The results of arsenic, cadmium, chromium, copper, mercury, nickel, lead, selenium, and zinc in Meddybemps Lake individual samples are listed and summarized in Appendix A - Tables A-1 (smallmouth bass fillets), A-4 (smallmouth bass reconstructed wholebody), A-7 (pumpkinseed wholebody), and A-10 (mussel composites). In New England, fish tissue concentrations of aluminum, barium, iron, magnesium, manganese, strontium, and vanadium are generally not evaluated as contaminants of concern. The reason, in part, is because relatively little information exists to evaluate the potential toxic effects of these contaminants in fish tissue. Consequently, it is not known if the concentrations of these metals detected in Meddybemps Lake fish are low or high, or if these contaminants are likely to cause toxic effects in fish or pose a risk to piscivorous wildlife. These analytes are not discussed in this report, although the analytical results for these elements are included in Appendix F.

Arsenic (As) - Arsenic was detected in all freshwater mussel tissue samples from lake sites with the greatest level detected in the Fowler Point composite sample (0.99 : g/g) followed by the Eastern Surplus Site (0.75 : g/g) and Staples Cove (0.52 : g/g). Generally, the mean As concentration in fish tissue is half the level in freshwater mussels from the lake. In fish tissue samples, no clear or significant pattern of As contamination is evident in the comparison of lake collection sites. Arsenic is not higher in tissue samples collected near the Eastern Surplus Site. Although fish of similar size were collected at each location, As residues in fish tissue varied widely among individual samples at each of the three collection locations. Arsenic concentrations in reconstructed wholebody smallmouth bass are similar at the Eastern Surplus Site (Ø 0.32 : g/g, range: 0.23 - 0.55 : g/g) and Fowler Point (Ø 0.32 : g/g, range: 0.10 - 0.77 : g/g), and appear lower at the Staples Cove location (Ø 0.20 : g/g, range: nondetect - 0.42 : g/g). In wholebody pumpkinseed, the mean As concentration at the Eastern Surplus Site is 0.30 : g/g (range: nondetect - 0.84 : g/g), while in Staples Cove the mean is 0.33 : g/g (range: nondetect - 0.73 : g/g). Arsenic was detected in 2 of the 5 pumpkinseed samples from Fowler Point at concentrations of 0.20 : g/g and 0.63 : g/g.

Cadmium (Cd) - Cadmium was not detected in bass fillet samples. In reconstructed wholebody bass, Cd was detected in three samples from the Eastern Surplus Site and in single samples from the Staples Cove and Fowler Point sites. Cadmium concentrations in wholebody bass, when detected, are similar (- 0.02 : g/g) among the three sites. Cadmium was detected much more frequently in wholebody pumpkinseed than bass. Of the three lake sites, however, Cd concentrations appear slightly higher in the Staples Cove reference area (Ø 0.04 : g/g) and at the Eastern Surplus Site (Ø 0.04 : g/g) than at Fowler Point (Ø 0.03 : g/g). The highest Cd concentrations were found in the mussel samples. The

highest levels among mussel samples were detected in the composites collected along the shorelines of Eastern Surplus Site (0.51 ：g/g) and Fowler Point (0.48 ：g/g), followed by the Staples Cove site (0.27 ：g/g).

Chromium (Cr) - Chromium was detected in only 3 of 15 Meddybemps Lake bass fillets (range: 0.13 - 0.50 ：g/g). Two detections were in Eastern Surplus Site fillet samples and one was in a Staples Cove sample. Higher Cr concentrations were found in wholebody samples. In reconstructed wholebody bass, Cr was highest at Fowler Point (Ø 0.85 ：g/g). Lower concentrations were detected in bass from Staples Cove (Ø 0.35 ：g/g) and the Eastern Surplus Site (Ø 0.26 ：g/g). The differences among sites, however, are not statistically significant. Chromium concentrations in reconstructed wholebody bass vary considerably at Staples Cove (Standard Deviation 0.19, range: 0.19 - 0.68 ：g/g), and the mean at Fowler Point is heavily influenced by one sample, FP04SM (3.29 ：g/g). If FP04SM is excluded as an outlier, Cr concentrations in reconstructed wholebody bass among lake sites are similar. No distinct differences in Cr contamination are evident in wholebody pumpkinseed. The mean Cr concentrations in pumpkinseed from the three sites ranges from 0.23 ：g/g to 0.30 ：g/g. Chromium concentrations in mussel samples are similar to wholebody fish concentrations. The Cr level in the Eastern Surplus Site (0.30 ：g/g) mussel sample is highest followed by Fowler Point (0.26 ：g/g) and Staples Cove (0.24 ：g/g).

Copper (Cu) - Copper was a common trace element contaminant in bass fillets. The mean Cu concentration for all Meddybemps Lake bass fillets is 0.46 ：g/g with significantly higher concentrations occurring in bass collected near the Eastern Surplus Site (Ø 0.94 ：g/g, range: 0.44 - 2.28 ：g/g). Mean Cu concentrations in bass fillets from the other lake collection sites are lower - Staples Cove 0.27 ：g/g, Fowler Point 0.16 ：g/g. The pattern of Cu concentrations in reconstructed wholebody bass from lake locations is similar to the fillet results. Copper is significantly higher in reconstructed wholebody bass collected near the Eastern Surplus Site (Ø 0.93 ：g/g, range: 0.78 - 1.09 ：g/g) and lowest in bass from Fowler Point (Ø 0.30 ：g/g, range: 0.15 - 0.45 ：g/g). In wholebody pumpkinseed, Cu appears higher at the Eastern Surplus Site (Ø 0.64 ：g/g) and lower at Fowler Point (Ø 0.31 ：g/g). In mussel samples, the Cr pattern is the opposite of pumpkinseed with the highest concentration occurring in the Fowler Point sample (0.93 ：g/g) and the lowest in the Eastern Surplus Site sample (0.58 ：g/g).

Mercury (Hg) - Mercury was detected in all bass fillets from lake sites. Bass from Staples Cove (Ø 0.41 ：g/g, range: 0.32 - 0.51 ：g/g) have significantly higher Hg concentrations in fillets than fish from Fowler Point (Ø 0.30 ：g/g, range: 0.23 - 0.36 ：g/g) or the Eastern Surplus Site (Ø 0.21 ：g/g, range: 0.14 - 0.30 ：g/g). Mercury accumulates primarily in axial muscle tissue and reconstructed wholebody bass concentrations are lower than fillets. In reconstructed wholebody bass, Hg appears higher in fish from Staples Cove (Ø 0.28 ：g/g) followed by Fowler Point (Ø 0.24 ：g/g) and the Eastern Surplus Site (Ø 0.18 ：g/g). Mercury concentrations in wholebody pumpkinseed are substantially lower than levels in reconstructed wholebody bass. The mean Hg concentrations in pumpkinseed from the three lake sites are similar - 0.08 ：g/g (Eastern Surplus Site), 0.08 ：g/g (Staples Cove), and 0.07 ：g/g

(Fowler Point). Mercury was not detected in the mussel sample from the Eastern Surplus Site. Concentrations in the Staples Cove and Fowler Point mussel samples are 0.03 ：g Hg/g and 0.04 ：g Hg/g, respectively.

Nickel (Ni) - Nickel was detected in only three of the 15 bass fillet samples - 0.12 ：g/g, 0.12 ：g/g, and 0.19 ：g/g. Detections of nickel in bass carcass were also infrequent (in two samples from each of the collection locations). Reconstructed wholebody bass Ni concentrations in the six samples range from 0.09 to 0.41 ：g/g. Nickel was detected even less frequently and at lower concentrations in wholebody pumpkinseed. Single pumpkinseed samples from the Eastern Surplus Site (0.20 ：g/g) and Staples Cove (0.14 ：g/g) had detectable levels of Ni. Nickel was detected in all three mussel composite samples from Meddybemps Lake. The highest concentration was found in the Staple Cove mussel sample (0.24 ：g/g) and the lowest at the Eastern Surplus Site (0.06 ：g/g).

Lead (Pb) - Lead in Meddybemps Lake fish was detected in the same pattern as Nickel - at low levels and infrequently. Two bass fillet samples contained detectable quantities of Pb (0.13 ：g/g, 0.22 ：g/g). Three of 15 carcass sample contained Pb. The reconstructed wholebody bass concentrations range from 0.09 ：g/g at the Eastern Surplus Site, to 0.12 ：g/g at the Staples Cove reference area. In wholebody pumpkinseed, Pb was not detected at the Eastern Surplus Site and detected in single samples from Staples Cove (0.14 ：g/g) and Fowler Point (0.18 ：g/g). The highest Pb concentrations occurred in the mussel composite samples. As with Ni, Pb concentrations are lowest in the Eastern Surplus Site mussel sample (0.20 ：g/g). Lead concentrations in the Fowler Point and Staples Cove mussel samples are 0.49 ：g/g and 0.29 ：g/g, respectively.

Selenium (Se) - Selenium was detected in 4 of 5 bass fillet samples from the Eastern Surplus Site (0 0.17 ：g/g, range: nondetect - 0.26 ：g/g), and in two of 5 samples at the Staples Cove and Fowler Point collection locations. When detected in fillets, Se concentrations at the Staples Cove and Fowler Point sites are not different from levels in fish from the Eastern Surplus Site. Selenium was rarely detected in carcass samples of bass. Consequently, reconstructed wholebody bass concentrations are lower than fillets. Selenium was not detected in wholebody pumpkinseed from any Meddybemps Lake location. In mussel samples, Se was not detected at the Eastern Surplus Site. The highest mussel Se concentration was detected at Fowler Point (0.23 ：g/g).

Zinc (Zn) - The mean Zn concentration for all bass fillets from Meddybemps Lake is 3.84 ：g/g. Zinc in bass fillets from the Eastern Surplus Site (0 4.26 ：g/g, range: 3.96 - 5.36 ：g/g) appear higher than fish from the Fowler Point (0 3.71 ：g/g, range: 3.27 - 4.24 ：g/g) or Staples Cove (0 3.55 ：g/g, range: 3.09 - 3.93 ：g/g) locations. In reconstructed wholebody bass, Zn is significantly higher at the Eastern Surplus Site (0 15.43 ：g/g) than the other collection sites. Zinc concentrations in wholebody pumpkinseed are not significantly different among collection locations. The grand mean for Zn in Meddybemps Lake pumpkinseed is 19.5 ：g/g. Zinc concentrations in pumpkinseed from the Eastern Surplus Site, Staples Cove, and Fowler Point are 19.0 ：g/g, 19.4 ：g/g, and 20.1 ：g/g, respectively

5.5.2 Organochlorine Pesticides - Lake Sites

Aldrin, HCB (hexachlorobenzene), heptaclor, *alpha* BHC (hexachlorocyclohexane), *alpha* chlordane, *beta* BHC, *delta* BHC, endrin, *gamma* BHC (lindane), *gamma* chlordane, heptachlor epoxide, mirex, oxychlordane and toxaphene were not detected in fish tissue samples. None of the 24 organochlorine pesticides included in the analytical scan were detected in composite mussel samples (Table 7).

The results of *cis*-nonachlor, *trans*-nonachlor, dieldrin, endosulfan II, and DDT metabolites in Meddybemps Lake individual samples are listed and summarized in Appendix B - Tables B-1 (smallmouth bass fillets), B-4 (smallmouth bass reconstructed wholebody), B-7 (pumpkinseed wholebody), and B-10 (mussel composites).

Cis-nonachlor - *Cis*-nonachlor was not detected in bass fillets or carcass samples, wholebody pumpkinseed, or mussel composite samples from Meddybemps Lake sites.

Trans-nonachlor - In Meddybemps Lake, *trans*-nonaclor was not detected in smallmouth bass fillets or in wholebody pumpkinseed or mussels. At concentrations between 0.0008 and 0.0010 ：g/g, *trans*-nonachlor was found in reconstructed wholebody bass collected from the Eastern Surplus Site (n = 2), Staples Cove (n = 1), and Fowler Point (n = 3).

Dieldrin - One bass carcass sample collected near the Eastern Surplus Site, MS03SMC, had a detectable level of dieldrin 0.009 ：g/g (reconstructed wholebody concentration 0.008 ：g/g). The contaminant was not detected in any other Meddybemps Lake biota sample.

Endosulfan II - Endosulfan was not detected in Meddybemps Lake fish fillet, wholebody pumpkinseed, or mussel composite samples. Three smallmouth bass collected near the Eastern Surplus Site had reconstructed wholebody concentrations ranging from 0.0009 to 0.0013 ：g/g.

DDT Metabolites - DDT metabolites include the *ortho para* (o,p') and *para para* (p,p') forms of DDD, DDE, and DDT. Of the six forms, the most frequently detected DDT metabolite in Meddybemps Lake fish tissue samples was p,p'-DDE. This form of DDE was detected in 4 of 15 fillet samples at concentrations ranging from 0.0010 ：g/g (Eastern Surplus Site) to 0.0025 ：g/g (Fowler Point). Mean p,p'-DDE concentrations in reconstructed wholebody bass from lake sites are 0.0050 ：g/g at the Eastern Surplus Site, 0.0053 ：g/g at Staples Cove, and 0.0059 ：g/g at Fowler Point. All 15 wholebody pumpkinseed from the lake had detectable levels of p,p'-DDE. Levels in wholebody pumpkinseed tend to be lower than concentrations in reconstructed wholebody bass. The mean p,p'-DDE level for all Meddybemps Lake pumpkinseed samples is 0.0021 ：g/g, while mean concentrations at the three collection sites are 0.0019 ：g/g (Eastern Surplus Site), 0.0025 ：g/g (Staples Cove), and 0.0018 ：g/g (Fowler Point).

Other DDT metabolites detected in fish tissue from lake sites were o,p'-DDE (two Fowler Point bass

carcass samples, FP03SMC at 0.00121 ：g/g and FP05SMC at 0.00112 ：g/g), p,p'-DDD (one bass carcass sample, SC02SMC at 0.00121 ：g/g), and p,p'-DDT (six carcass samples). The mean concentrations of p,p'-DDT in reconstructed wholebody bass from the Eastern Surplus Site and from Staples Cove are 0.0008 ：g/g.

5.5.3 PCBs - Lake Sites

Total PCB results are included in Appendix B, Tables B-1 (bass fillets), B-4 (reconstructed wholebody bass), B-7 (wholebody pumpkinseed), and B-10 (mussels). Figure 14 and Figure 16 illustrate total PCB levels in reconstructed wholebody bass and wholebody pumpkinseed, respectively. The results of PCB homolog analyses for Meddybemps Lake fish and mussels are listed in Appendix C, Tables C-1 (bass fillets), C-4 (bass reconstructed wholebody), C-7 (pumpkinseed wholebody), and C-10 (mussels). Figures 18 (bass reconstructed wholebody) and 20 (pumpkinseed wholebody) depict PCB homolog patterns. Tables in Appendix D (D-1, D-4, D-7, D-10) list and summarize non-*ortho* and mono-*ortho* PCB congeners results for Meddybemps Lake fish and mussels, while the results for di-*ortho* congeners are tabulated in Appendix E (E-1, E-4, E-7, E-10). Figure 24 plots non-*ortho* PCB congener concentrations in Meddybemps Lake smallmouth bass fillet and carcass samples. Figures 26 and 29 show dominant PCB congener patterns in fish and mussels.

Total PCBs - Total PCBs (GPCB) is the sum of detections in the congener-specific analyses. In Meddybemps Lake, significantly higher concentrations of GPCB were found in bass samples collected adjacent to the Eastern Surplus Site than the other two collection sites. In bass fillet samples, mean GPCB concentrations by collection location are 0.017 ：g/g at the Eastern Surplus Site, 0.009 ：g/g at Fowler Point, and 0.006 ：g/g at Staples Cove. In reconstructed wholebody bass, the mean GPCB concentration for Meddybemps Lake (all sites combined) is 0.043 ：g/g. As with fillets, significantly higher GPCB concentrations in reconstructed wholebody bass were found in fish taken near the Eastern Surplus Site (0 0.084 ：g/g) than in bass from Fowler Point (0 0.026 ：g/g) or Staples Cove (0 0.019 ：g/g). The mean GPCB concentration for pumpkinseed collected in Meddybemps Lake adjacent to the Eastern Surplus Site is 0.013 ：g/g (range: 0.007 - 0.018 ：g/g), while the mean at Fowler Point is 0.006 ：g/g (range: 0.005 - 0.008 ：g/g). In mussel composite samples from Meddybemps Lake, GPCB appears higher in the Fowler Point and Eastern Surplus samples (0.004 ：g/g) than in the Staples Cove sample (0.001 ：g/g).

PCB Homologs - In Meddybemps Lake smallmouth bass fillets, hexa-chlorobiphenyl and hepta-chlorobiphenyl homologs were found in the highest concentrations. Hepta-chlorobiphenyl congeners formed 47%, 70%, and 55% of the GPCB concentration at the Eastern Surplus, Staples Cove, and Fowler Point collection sites, respectively. Few other homologs were detected in bass fillets with one exception. In bass fillets from the Eastern Surplus Site, the octa-chlorobiphenyl homologs formed 6% of the GPCB concentration. In reconstructed wholebody bass, frequently-occurring homologs groups included tetra-, penta-, hexa-, hepta-, and octa-chlorobiphenyl. As in the case of bass fillets, the hepta- and hexa-chlorobiphenyl groups were the most common homologs in reconstructed wholebody

bass comprising 70 to 85% of the GPCB concentration. The PCB homologs pattern appears more distinct in pumpkinseed samples. Tetra- and penta-chlorobiphenyl congeners were detected in pumpkinseed collected adjacent to the Eastern Surplus Site, but with much less frequency in pumpkinseed from Staples Cove or Fowler Point. In mussels, hexa- and hepta-chlorobiphenyl were detected in the composite sample collected near the Eastern Surplus Site. Lower concentrations of hepta-chlorobiphenyl congeners were detected in the Staples Cove mussel sample.

PCB Congeners - The predominant PCB congener in smallmouth bass fillets from Meddybemps Lake was PCB #170 (18 - 62% of GPCB; highest conc. in 10 of 15 samples) followed by PCB #153 (highest in remaining 5 samples). The most toxic, non-*ortho* coplanar PCB congeners (i.e., #77, #126, #169) did not constitute a major portion of the GPCB concentration in fillet samples. In bass fillets, PCB congeners #77, #126, and #169 generally comprised less than 1% of the GPCB concentration. The fillet sample with the highest level, SC01F, had a total non-*ortho* congener concentration of 0.000091 : g/g (or 91 pg/g, parts-per-trillion). The average total non-*ortho* PCB concentration in bass fillets is also higher at Staples Cove (0 42.6 pg/g, range: nondetect - 91 pg/g) than at the Eastern Surplus Site (0 19.6 pg/g, range: nondetect - 36 pg/g) or Fowler Point (0 5.4 pg/g, range: nondetect - 15 pg/g).

Total PCB concentrations detected in Meddybemps Lake bass were low compared to other Maine, regional, and national fish tissue studies. In this report, only planar PCB congener concentrations were calculated for "reconstructed" wholebody fish. We did not reconstruct wholebody concentrations for all 60+ congeners detected in fish tissue. Note that the following comments sometimes describe congener concentrations in reconstructed wholebody fish or carcass samples.

At lake collection locations, an average of 54 congeners were detected in smallmouth bass carcass samples. Typically, carcass samples had the highest number of congeners of the three fish sample types (i.e., fillet, carcass, wholebody). Fowler Point bass carcass samples had the highest number of congeners (0 63), while Staples Cove had the lowest (0 47). In smallmouth bass carcass samples, PCB #153 was the dominant congener in 14 of the 15 samples. The dominant congener pattern in Meddybemps Lake bass carcasses is similar (see Figure 26) at the three collection locations. Overall, PCB congeners #153, #180, #138, #187/182, and #170 formed the majority of the total PCB concentration in carcass tissue. Non-*ortho* PCB congeners #77, #126, #169 accounted for 0.5% or less of the GPCB concentration in reconstructed wholebody bass. These congeners occurred in higher percentages in Staples Cove reconstructed wholebody bass than in bass from the Eastern Surplus Site. Expressed as concentrations, however, the highest total non-*ortho* PCB levels were found in a reconstructed wholebody bass from Fowler Point (89.3 pg/g) followed by Staples Cove (69.8 pg/g) and the Eastern Surplus Site (48.2 pg/g).

The pattern of congeners comprising the bulk of the GPCB concentration in wholebody pumpkinseed varies among the three lake collection locations. PCB #153, PCB #180, and PCB #138 account for half of the GPCB concentration in pumpkinseed samples collected adjacent to the Eastern Surplus Site.

At Fowler Point, PCB #136 and PCB #170 are the principal congeners in pumpkinseed, together forming as much as 51% of the GPCB concentration. At Staples Cove, PCB #153 comprises the highest percentage of GPCB (10 - 18%) with PCB #60/56, PCB #138, and PCB #170 occurring in significant percentages in different pumpkinseed samples. Of the three most toxic non-*ortho* PCB congeners, PCB #77 was not detected in pumpkinseed from Staples Cove. PCB #126 and #169 were detected in pumpkinseed from all three collection locations. Mean total non-*ortho* PCB congener concentrations (#77 + #126 + #169) in pumpkinseed are similar among the three locations ranging from 19.4 pg/g (Staples Cove) to 22.0 pg/g (Fowler Point).

Over 30 PCB congeners were detected in the Meddybemps Lake mussel tissue sample collected adjacent to the Eastern Surplus Site. Mussel samples from Fowler Point and Staples Cove had 20 and 10 congeners, respectively. The principle PCB congeners in mussel composite samples were #170 and #60/56. In Staples Cove, Fowler Point, and Eastern Surplus samples, these congeners comprised 66%, 35%, and 22%, respectively, of the GPCB concentration. The most toxic non-*ortho* PCB congeners were only detected in the mussel composite sample taken from Staples Cove. In that sample, PCB #169 (66 pg/g) made up 6.2% of the GPCB concentration and PCB #126 (12 pg/g) accounted for 1.1%.

5.6 Dennys River and East Machias River - Analytical Results

5.6.1 Trace Elements - River Sites

The results of arsenic, cadmium, chromium, copper, mercury, nickel, lead, selenium, and zinc in Dennys River and East Machias River individual samples are listed and summarized in Appendix A - Tables A-2 (Dennys River smallmouth bass and brook trout fillets), A-3 (East Machias River smallmouth bass fillets), A-5 (Dennys River smallmouth bass and brook trout reconstructed wholebody), A-6 (East Machias River smallmouth bass reconstructed wholebody), A-8 (Dennys River white sucker wholebody), A-9 (East Machias River white sucker wholebody) and A-10 (mussel composites). In New England, fish tissue concentrations of aluminum, barium, iron, magnesium, manganese, strontium, and vanadium are generally not evaluated as contaminants of concern. The reason, in part, is because relatively little information exists to evaluate the potential toxic effects of these contaminants in fish tissue. Consequently, it is not known if the concentrations of these metals detected in Dennys River and East Machias River fish are low or high, or if these contaminants are likely to cause toxic effects in fish or pose a risk to piscivorous wildlife. These analytes are not discussed in this report, although the analytical results for these elements are included in Appendix F.

Arsenic (As) - Arsenic concentrations in smallmouth bass fillets do not differ significantly between rivers. Concentrations of As in bass fillets from the Dennys River deadwater reach (0 0.33 : g/g, range: 0.19 - 0.56 : g/g) are similar to bass fillets from the East Machias River (0 0.39 : g/g, range: nondetect - 0.53 : g/g). Brook trout fillets from the Dennys River/Dead Stream confluence have a mean As concentration of 0.21 : g/g. The lowest As concentrations in bass fillets (0 0.18 : g/g, range:

nondetect - 0.38 ：g/g) appear to be in fish collected in the Dennys River section adjacent to the Eastern Surplus Site. Reconstructed wholebody bass also do not have significantly different As concentrations between rivers. Arsenic in reconstructed wholebody bass from the Dennys River is 0.12 ：g/g in fish from the Eastern Surplus Site reach and 0.29 ：g/g in the deadwater reach. Reconstructed wholebody brook trout in the Dennys River have a mean As concentration of 0.24 ：g/g (range: nondetect - 0.39 ：g/g). The As concentration in reconstructed wholebody bass from the East Machias River is 0.22 ：g/g. Arsenic was infrequently detected in wholebody white sucker samples from the Dennys River. Only one sample at each of the three collection locations had a detectable level of As. In the East Machias River, all but one sample had detectable levels of As (0 0.34 ：g/g, range: nondetect - 0.55 ：g/g). Arsenic concentrations in mussels composite samples were similar. In the East Machias River mussel sample the As concentration is 0.68 ：g/g, while the levels in the two Dennys River samples are 0.70 ：g/g and 0.75 ：g/g.

Cadmium (Cd) - Cadmium was not detect in any fillet samples from either river. In reconstructed wholebody bass, Cd was most frequently detected (5 of 6 samples) and most elevated in fish from the East Machias River (0 0.03 ：g/g, range: nondetect - 0.05 ：g/g). Four Dennys River reconstructed wholebody bass (range: 0.02 - 0.04 ：g/g) had detectable levels of Cd, while the contaminant was not found in the remaining six bass. Two (of 5) Dennys River brook trout reconstructed wholebody samples had an estimated Cd concentration of 0.02 ：g/g. Wholebody white sucker (0 0.04 ：g/g, range: 0.02 - 0.07 ：g/g) from the East Machias River had significantly higher Cd concentrations than suckers from the Dennys River. Mean Cd concentrations in Dennys River white suckers are 0.03 ：g/g at the Eastern Surplus Site and in the deadwater reach. Only one sucker from the Dennys River/Dead Stream confluence had a measurable amount of Cd (0.04 ：g/g). In mussel composite samples, Cd appears to occur in a higher amount in the East Machias River sample (0.72 ：g/g) than in the Dennys River samples (0.59 ：g/g, 0.39 ：g/g).

Chromium (Cr) - Chromium appears to occur in higher amounts in bass fillets from the Eastern Surplus reach of the Dennys River than the East Machias River. However, one of the Eastern Surplus reach bass fillet samples was highly elevated (2.49 ：g/g) compared to all other Cr fillet values. Of the remaining four fish from the Dennys River Eastern Surplus reach, two bass fillets were non-detects and the other two had concentrations of 0.15 ：g/g. Due to the variability of the bass fillet data at the Eastern Surplus Site, a statistical comparison of Cr values to the East Machias River fillet data set is not possible. Chromium data in fillets is further confounded by the fact that bass fillets from the Dennys River deadwater reach were all non-detects, while all brook trout fillets from the Dennys River/Dead Stream confluence had detectable Cr (0 0.20 ：g/g, range: 0.14 - 0.34 ：g/g). No significant differences in Cr concentrations were found in reconstructed wholebody bass or wholebody white sucker between the rivers. Reconstructed wholebody bass from the Dennys River had mean Cr concentrations of 0.38 ：g/g (Eastern Surplus reach, range: 0.14 - 0.88 ：g/g) and 0.28 ：g/g (deadwater, range: nondetect - 0.41 ：g/g), while bass from the East Machias have a mean of 0.66 ：g/g (range: 0.19 - 1.72 ：g/g). Reconstructed wholebody brook trout from the Dennys River have a mean Cr level of 0.24 ：g/g (range: 0.19 - 0.32 ：g/g)

Copper (Cu) - Copper was detected in all but one of the bass fillet samples from river locations. The mean Cu concentrations in Dennys River bass fillets are 0.62 ∶g/g (range: 0.21 - 1.42 ∶g/g) in fish collected adjacent to the Eastern Surplus Site and 0.25 ∶g/g (range: 0.16 - 0.31 ∶g/g) in bass collected from the deadwater. Brook trout taken from confluence of Dead Stream and the Dennys River have a mean Cu concentration of 0.38 ∶g/g. In comparison, bass fillets from the East Machias River have a mean Cu concentration of 0.37 ∶g/g (range: nd - 0.87 ∶g/g). Reconstructed wholebody bass from the three river collection site have similar Cu concentrations. In the two Dennys River bass collection reaches, the mean Cu concentration in reconstructed wholebody bass is 0.41 ∶g/g. In the East Machias River, reconstructed wholebody bass have a mean Cu concentration of 0.47 ∶g/g. Of all the locations in this study, Cu is highest in reconstructed wholebody brook trout from the confluence of Dead Stream and Dennys River with a mean concentration of 0.94 ∶g/g (range: 0.64 - 1.37 ∶g/g).

Mercury (Hg) - Mean Hg concentrations in bass fillets from the Dennys River (Θ 0.45 ∶g/g, range: 0.23 - 0.87 ∶g/g) are similar to concentrations in East Machias River bass (Θ 0.41 ∶g/g, range: nondetect - 0.70 ∶g/g). Brook trout fillets from the Dennys River/Dead Stream confluence have lower fillet Hg concentrations (Θ 0.09 ∶g/g, range: 0.07 - 0.11 ∶g/g) than bass. Since Hg primarily accumulates in axial muscle tissue, concentrations in reconstructed wholebody smallmouth bass and brook trout are lower than fillet levels. Reconstructed wholebody bass collected in the Dennys River adjacent to the Eastern Surplus site have a mean Hg concentration of 0.25 ∶g/g, while bass from the deadwater reach and brook trout from Dead Stream have mean Hg concentrations of 0.39 ∶g/g and 0.07 ∶g/g, respectively. In the East Machias River, reconstructed wholebody bass have a mean Hg concentration of 0.36 ∶g/g. Mercury concentrations in wholebody white sucker from the Dennys River (Θ 0.10, range: 0.05 - 0.27 ∶g/g) are not significantly different than suckers collected from the East Machias River (Θ 0.11, range: nondetect - 0.19 ∶g/g). Mercury was not detected in either of the Dennys River mussel composite samples. In the East Machias River composite mussel sample, the Hg concentration was 0.10 ∶g/g.

Nickel (Ni) - Nickel was not detected in Dennys River bass fillets, but it was detected in two brook trout fillet samples at the same concentration (0.22 ∶g/g). One East Machias River bass fillet sample had a Ni concentration of 0.15 ∶g/g. In reconstructed wholebody samples, Ni was detected in two bass from the Eastern Surplus Site (0.18 ∶g/g, 0.20 ∶g/g), in three bass from the deadwater reach (range: 0.12 - 0.18 ∶g/g), and in two brook trout from Dead Stream (0.14 ∶g/g, 0.16 ∶g/g). The highest Ni concentration (0.45 ∶g/g) was detected in a reconstructed wholebody smallmouth bass from the East Machias River. Only one other reconstructed wholebody bass in the East Machias River had a detectable Ni concentration (0.10 ∶g/g). In wholebody white sucker, Ni was rarely detected in the Dennys River. Two samples (of 15) had detectable levels of Ni (0.11 ∶g/g, 0.15 ∶g/g). Two wholebody white sucker (of 5) had Ni with concentrations of 0.14 ∶g/g and 0.33 ∶g/g. Nickel was detected in all river mussel composite samples. The Ni level in Dennys River mussels samples (Θ 0.12 ∶g/g) is less than the concentration in the sample from the East Machias River (0.46 ∶g/g).

Lead (Pb) - Lead was not detected in brook trout or bass fillet samples or in reconstructed wholebody

fish from the Dennys River. In the East Machias River, Pb was not detected in bass fillets. However, one reconstructed wholebody bass from the East Machias River had a Pb concentration of 0.12 ：g/g. Two wholebody white sucker from the Dennys River (0.14 ：g/g and 0.11 ：g/g) and one sucker from the East Machias River (0.12 ：g/g) contained Pb. Lead was found in all mussel samples. The highest Pb concentration in a mussel composite samples (0.79 ：g/g) was from the East Machias River. The two mussel composite samples from the Dennys River have Pb concentrations of 0.27 ：g/g and 0.19 ：g/g.

Selenium (Se) - In the Dennys River, Se was detected in only two brook trout fillets (0.23 ：g/g and 0.34 ：g/g) and in 3 of 5 fillet samples from Eastern Surplus Site (Ø 0.11 ：g/g) and the deadwater location (Ø 0.14 ：g/g). The highest mean (Ø 0.23 ：g/g) and individual (0.42 ：g/g) Se fillet concentration was found in the East Machias River. Selenium is found more often in fillet than carcass samples, and reconstructed wholebody concentrations reflect this partitioning. The mean Se concentration in reconstructed wholebody bass from the Eastern Surplus location on the Dennys River is 0.08 ：g/g, while the mean in the deadwater reach is 0.13 ：g/g. In the East Machias River, reconstructed wholebody bass have a significantly higher Se concentration (Ø 0.14 ：g/g) than reconstructed wholebody bass from the Dennys River. Selenium was only detected in one wholebody white sucker (0.10 ：g/g) from the Eastern Surplus Site reach of the Dennys River. No other white sucker samples from the Dennys River or East Machias River had detectable Se. In mussel composite samples, Se was detected in the highest concentration in the East Machias River sample. In the Dennys River, Se was not detected in sample ES02AF below the Route 191 bridge and detected at 0.12 ：g/g adjacent to the Eastern Surplus Site.

Zinc (Zn) - In fillet samples, the highest Zn concentration (Ø 10.31 ：g/g, range: 8.93 - 11.40 ：g/g) was found in brook trout from the Dennys River/Dead Stream confluence. In bass fillets, there was no significant differences among the Dennys River or East Machias River sites. The mean for all bass fillets in the Dennys River (Ø 4.15 ：g/g, range: 3.44 - 5.46 ：g/g) appears higher than fillets from the East Machias River (Ø 3.88 ：g/g, range: 3.28 - 4.47 ：g/g). Zinc is also higher in Dennys River reconstructed wholebody brook trout (Ø 20.10 ：g/g, range: 18.45 - 22.87 ：g/g) than reconstructed wholebody bass from the Dennys River (Ø 15.34 ：g/g, range: 10.80 - 17.94 ：g/g) or the East Machias River (Ø 13.18 ：g/g, range: 11.81 - 14.88 ：g/g). The mean Zn concentration in wholebody white sucker from the Dennys River (18.4 ：g/g) is nearly the same as fish from the East Machias River (18.3 ：g/g). In mussel composite samples, Zn appears slightly higher in the East Machias River sample (17.8 ：g/g) than the Dennys River samples (16.1 ：g/g and 16.6 ：g/g).

5.6.2 Organochlorine Pesticides - River Sites

Aldrin, HCB (hexachlorobenzene), heptaclor, *alpha* BHC (hexachlorocyclohexane), *alpha* chlordane, *beta* BHC, *delta* BHC, endrin, *gamma* BHC (lindane), *gamma* chlordane, heptachlor epoxide, mirex, oxychlordane and toxaphene were not detected in fish tissue samples. None of the 24 organochlorine pesticides included in the analytical scan were detected in composite mussel samples (Table 7).

The results of *cis*-nonachlor, *trans*-nonachlor, dieldrin, endosulfan II, and DDT metabolites in Dennys River and East Machias River individual samples are listed and summarized in Appendix B - Tables B-2 (Dennys River smallmouth bass and brook fillets), B-3 (East Machias River smallmouth bass fillets), B-5 (smallmouth bass and brook trout reconstructed wholebody), B-6 (East Machias River smallmouth bass reconstructed wholebody), B-8 (Dennys River white sucker wholebody), B-9 (East Machias River white sucker wholebody), and B-10 (mussel composites).

Cis-nonachlor - *Cis*-nonachlor was not found in mussel tissue samples from river sites and rarely detected in fish tissue. The compound was detected in only three Dennys River bass carcass samples. One fish was collected below the Meddybemps Lake dam and two were collected in the deadwater reach. The reconstructed wholebody bass concentrations of *cis*-nonachlor for these fish are 0.0010 ：g/g (ES02SM), 0.0013 ：g/g (DW01SM) and 0.0018 ：g/g (DW02SM).

Trans-nonachlor - Fillet samples from river fish, brook trout and smallmouth bass, did not contain *trans*-nonachlor. When detected, concentrations of this contaminant in smallmouth bass reconstructed wholebody samples ranged from 0.0010 to 0.0018 ：g/g in the Dennys River (n = 5) and 0.0011 to 0.0012 ：g/g in the East Machias River (n = 3). White sucker in either river did not have detectable levels of *trans*-nonachlor.

Dieldrin - In fish fillets from river sites, dieldrin was detected in only two samples. In brook trout collected from the Dennys River/Dead Stream confluence, the fillet concentrations for dieldrin are 0.0038 ：g/g and 0.0034 ：g/g. Dieldrin was detected in all brook trout carcass samples and the mean reconstructed wholebody trout concentration for the Dead Stream location was 0.0039 ：g/g. Two bass carcass samples from the Dennys River and East Machias River also contained dieldrin. The dieldrin reconstructed wholebody concentrations in Dennys River bass (0.0012 and 0.0010 ：g/g) are slightly higher than bass from the East Machias River (0.0008 and 0.0009 ：g/g). One wholebody white sucker sample from the Dennys River/Dead Stream confluence had a dieldrin concentration of 0.0025 ：g/g. The contaminant was not detected in white sucker samples from the East Machias River.

Endosulfan II - Endosulfan was not detected in East Machias River fish and mussel tissue samples. Bass fillets, wholebody white sucker, and mussel composite samples from the Dennys River also did not have detectable levels of endosulfan. Three reconstructed wholebody bass from the Dennys River had endosulfan II concentrations ranging from 0.0011 to 0.0026 ：g/g.

DDT Metabolites - DDT metabolites include the *ortho para* (o,p') and *para para* (p,p') forms of DDD, DDE, and DDT. As with Meddybemps Lake fish, the most frequently detected DDT metabolite in Dennys River and East Machias River fish tissue was p,p'-DDE. Four of five brook trout fillets from the Dennys River/Dead Stream confluence location had p,p'-DDE (0 0.0070 ：g/g, range: nondetect - 0.0119 ：g/g). Concentrations of p,p'-DDE in bass fillets, when detected, are lower than brook trout fillets. In reconstructed wholebody fish, brook trout (0 0.0092 ：g/g, range: 0.0043 - 0.0160 ：g/g)

from the Dennys River/Dead Stream confluence also have a higher mean p,p'-DDE level than bass from either river. The mean p,p'-DDE concentration in Dennys River bass is 0.0068 ∶g/g, while the mean in East Machias River reconstructed wholebody bass is 0.0056 ∶g/g. Wholebody white sucker from the Dennys River have a mean p,p'-DDE concentration of 0.0021 ∶g/g, and the highest levels were detected in suckers from the Dead Stream location (0 0.0040 ∶g/g, range: 0.0010 - 0.0078 ∶g/g). Only two of five wholebody white sucker from the East Machias River had a detectable level of p,p'-DDE (0.0037 ∶g/g and 0.0010 ∶g/g).

Other DDT metabolites detected in fish tissue from river sites were o,p'-DDD (one Dennys River bass carcass sample, DW02SMC at 0.000998 ∶g/g), o,p'-DDT (one Dennys River bass carcass sample, ES02SMC at 0.000975 ∶g/g), p,p'-DDD (one Dennys River brook trout fillet sample, DS05BTF at 0.00446 g/g, and six carcass samples - two bass at the Dennys River deadwater, two trout at the Dead Stream confluence, and two bass in the East Machias). Three wholebody white sucker samples from the Dead Stream location also had detectable levels of p,p'-DDD. The metabolite p,p'-DDT was found in 5 carcass samples, all bass. The reconstructed wholebody p,p'-DDT concentrations in these fish range from 0.0008 ∶g/g (East Machias River) to 0.0014 ∶g/g Dennys River deadwater.

5.6.3 PCBs - River Sites

Total PCB results for river sites are included in Appendix B, Tables B-2 and B-3 (bass and trout fillets), B-5 and B-6 (reconstructed wholebody bass and trout), B-8 and B-9 (wholebody white sucker), and B-10 (mussels). Figure 15 and Figure 17 illustrate GPCB levels in reconstructed wholebody bass and wholebody white sucker from river sites, respectively. The results of PCB homolog analyses for Dennys River and East Machias River fish and mussels are listed in Appendix C, Tables C-2 and C-3 (bass and trout fillets), C-5 and C-6 (bass and trout reconstructed wholebody), C-8 and C-9 (white sucker wholebody), and C-10 (mussels). Figures 19 (bass and brook trout reconstructed wholebody) and 21 (white sucker wholebody) depict PCB homolog patterns. Tables in Appendix D (D-2, D-3, D-5, D-6, D-8, D-9, D-10) list and summarize non-*ortho* and mono-*ortho* PCB congeners results for Dennys River and East Machias River fish and mussels, while the results for di-*ortho* congeners are tabulated in Appendix E (E-2, E-3, E-5, E-6, E-8, E-9, E-10). Figure 25 plots non-*ortho* PCB congener concentrations in Dennys River and East Machias River smallmouth bass fillet and carcass samples. Figures 27, 28, and 29 show dominant PCB congener patterns in fish and mussels from river sites.

Total PCBs - Total PCBs (GPCB) is the sum of detections in the congener-specific analyses. In smallmouth bass fillets, GPCB is significantly higher in fish from the Dennys River (0 0.031 ∶g/g, mean of samples from both locations) than in fish from the East Machias River (0 0.006 ∶g/g). Brook trout fillets from the Dead Stream location appear to have slightly higher GPCB concentration (0 0.044 ∶g/g) than bass. In reconstructed wholebody bass, the highest GPCB concentration was found in fish from the deadwater reach of the Dennys River (0 0.172 ∶g/g, range: 0.033 - 0.269 ∶g/g). Reconstructed wholebody brook trout from Dead Stream have a mean GPCB concentration of 0.055

: g/g. Total PCB concentrations in wholebody white sucker from the Dennys River are similar at each location. At the Eastern Surplus Site, deadwater, and Dead Stream reaches the mean GPCB concentrations are 0.054 : g/g, 0.052 : g/g, and 0.032 : g/g, respectively. These levels are significantly different from concentrations in white sucker from the East Machias River. The mean GPCB concentration in wholebody white sucker from the East Machias River is 0.012 : g/g. In riverine mussel samples, GPCB concentrations appear to be higher at the two Dennys River locations than at the East Machias River collection site. The GPCB concentration in the Dennys River alewife floater sample collected below the Route 191 bridge (0.010 : g/g) is twice as high as the sample collected adjacent to the Eastern Surplus Site (0.005 : g/g). The GPCB concentration in the eastern elliptio sample collected from the East Machias River location (0.002 : g/g) is considerably lower than the Dennys River alewife floater samples.

PCB Homologs - The most frequently detected homologs in bass and trout fillets from the Dennys River are the hexa- and hepta-chlorobiphenyl homologs. Approximately 75 to 90% of the GPCB concentration is comprised of these two homologs. Lesser percentages of the octa-chlorobiphenyl group were found in bass fillets collected adjacent to Eastern Surplus (7%) and in the deadwater (8%). The penta-chlorobiphenyl homologs (comprising 7% of the GPCB concentration) were also found in bass fillet samples from the Eastern Surplus reach. In the East Machias River, PCBs were detected at very low concentrations in bass fillet tissue and the tetra- and hepta-chlorobiphenyl homologs appear to be the major homologs. In reconstructed wholebody bass from river sites, the hexa-chlorobiphenyl group formed the majority of the GPCB concentration (40% or greater). In the Eastern Surplus (41%) and deadwater (40%) reaches of the Dennys River and in the East Machias River (19%), the hepta-chlorobiphenyl homologs were also detected in high percentages. Penta- and octa-chlorobiphenyl homologs were detected in Dennys River reconstructed wholebody smallmouth bass at lower percentages (< 10% of GPCB). In East Machias River reconstructed wholebody bass, the penta-chlorobiphenyl homologs comprised 24% of the GPCB concentration. In Dennys River wholebody white sucker, hexa- and hepta-chlorobiphenyl homologs comprised over 80% of the GPCB concentration, while tetra-, penta-, and octa-chlorobiphenyl homologs accounted for most of the remainder. The only PCB homologs detected in the East Machias River eastern elliptio composite sample was hepta-chlorobiphenyl.

PCB Congeners - More PCB congeners were detected in smallmouth bass fillets from the Dennys River (n=38) than in the East Machias River (n=20). The pattern of PCB congeners in bass fillet from the Dennys River is different from East Machias River bass fillets (Figure 27). In the Dennys River, PCB congeners #153, #180, #138, #187/182, and #170 were dominant in bass fillet samples. In contrast, PCB congeners #72, #1, and #170 comprised a significant percentage of the GPCB concentration in East Machias River bass fillets. The most toxic non-*ortho* PCB congeners (#77, #126, #169) were not detected in any consistent pattern within a location or among collection locations. In five Dennys River bass fillet samples collected adjacent to the Eastern Surplus Site, two of the samples did not contain concentrations of the three most toxic non-*ortho* PCB congeners, while the other three samples had total non-*ortho* levels of 22 pg/g, 47 pg/g, and 55 pg/g. In bass fillets from the

Dennys River deadwater reach, the pattern was similar. Two of the samples did not contain the most toxic non-*ortho* PCB congeners and the total non-*ortho* concentration in the other three samples ranged from 10 pg/g to 26 pg/g. East Machias River bass fillets are similar in their inconsistent non-*ortho* PCB congener pattern. Half to the samples (n=3) did not have detectable levels of PCB # 77, #126, or #169. In the other three bass fillet samples, total non-*ortho* PCB congener concentrations are 21 pg/g, 28 pg/g, and 50 pg/g. Of the five trout fillet samples from the Dead Stream confluence with the Dennys River, only one had a hit of a non-*ortho* PCB congener. PCB #126 was detected at 38 pg/g in brook trout sample DS05BTF.

Total PCB concentrations detected in Dennys River and East Machias River bass and trout were often low compared to other Maine, regional, and national fish tissue studies. In this report, only planar PCB congener concentrations were calculated for "reconstructed" wholebody fish. We did not reconstruct wholebody concentrations for all 60+ congeners detected in fish tissue. Note that the following comments sometimes describe congener concentrations in reconstructed wholebody fish or carcass samples.

The number of congeners detected in bass carcasses is similar in the Dennys River (Ø 52) and East Machias River (Ø 54). Brook trout carcasses from the Dead Stream and Dennys River confluence had an average of 34 different congeners. The PCB congener pattern in Dennys River bass carcass samples is nearly identical to the pattern in fillets (Figure 27). PCB #153, #180, #138, #187/182, and #170 were the dominant congeners in Dennys River bass carcasses. Of these, PCB #153, #138, and #180 generally formed the bulk (~40%) of the ΣPCB concentration in Dennys River bass carcasses. The same congeners comprised much of the brook trout carcass PCB burden except that congener #60/56 was found in a considerable amount (16% and 8%) in two samples. In the East Machias River, PCB #153 and #138 accounted for approximately 25% of the ΣPCB concentration in most bass carcass samples. A number of other congeners were found in greater percentages in East Machias River bass carcasses than in Dennys River bass. PCB #101 and #118/108 together formed as much as 10% of the total PCB concentration in East Machias River bass carcasses.

Bass in the deadwater reach of the Dennys River had the highest ΣPCB concentrations. Correspondingly, reconstructed wholebody bass from the deadwater of the Dennys River also had the highest concentrations of non-*ortho* PCB congeners. The mean total non-*ortho* congener concentration (#77 + #126 + #169) in reconstructed wholebody bass from the deadwater is 121 pg/g. PCB #126, a highly toxic non-*ortho* congener, was detected at 174.0 pg/g and 174.5 pg/g in two deadwater reconstructed wholebody bass. Lower total non-*ortho* concentrations were detected in reconstructed wholebody bass from the Dennys River adjacent to the Eastern Surplus Site (max. 51.7 pg/g), the East Machias River (max. 72.3 pg/g) and in reconstructed wholebody brook trout from the Dead Stream confluence with the Dennys River (max. 52.6 pg/g).

Compared to the average number of PCB congeners in Dennys River white suckers (Ø 46), there are significantly fewer PCB congeners detected in East Machias River suckers (Ø 15). Among East

Machias River sucker samples, PCB #72 and PCB #170 are the most common congeners that formed the bulk of the GPCB concentration. PCB #72 accounted for 72%, 64% and 25% of the total PCB concentration in three East Machias River white sucker samples. In the Dennys River, the dominant PCB congener pattern in white suckers is consistent with the pattern observed in smallmouth bass. PCB #153, #180, #138, #187/182, and #170 were the dominant congeners. In the Dennys River, the combined concentrations of non-*ortho* PCB congeners (#77, #126, #169) is not as high in white sucker as in bass. Even in the deadwater reach (0 41 pg/g, range: nondetect - 93 pg/g), the total non-ortho PCB congener concentration in white suckers is not highly elevated compared to fish from the reach adjacent to the Eastern Surplus Site (0 17 pg/g, range: nondetect - 31 pg/g), at the Dead Stream confluence (0 58 pg/g, range: nondetect - 96 pg/g), or the East Machias River (0 32 pg/g, range: nondetect - 69 pg/g)

The number of PCB congeners detected in mussel samples from river collection sites range from 18 to 26. PCB#170 is the predominant congener in the East Machias sample (49% of the GPCB concentration), and a significant portion of the GPCB concentration in the Dennys River samples, 12% in ES02AF and 15% in ES01AF. The most toxic non-*ortho* PCB congeners (#77, #126, #169) were not detected in Dennys River or East Machias River mussel composite samples.

6.0 Discussion

In this section, brief notes on the concentrations of several environmentally-important contaminants are presented. Contaminant concentrations in samples potentially impacted by the Eastern Surplus Site are placed in context with the reference locations in Meddybemps Lake (i.e., Staples Cove) or the East Machias River. Data are also compared with values reported from national, regional, or state sources, or with levels reported in the scientific literature. For most organochlorine and trace elements, we compared our results to national mean levels reported in the U.S. Fish and Wildlife Service's National Contaminant Biomonitoring Program (NCBP, Schmitt and Brumbaugh 1990, Schmitt *et al*. 1990). The NCBP tracks temporal and geographic trends in contaminant concentrations in composite samples of whole fish collected from 112 riverine stations throughout the United States. The latest results of the NCBP include fish collected in 1984. We recognize the limitations associated with the NCBP data sets, but find it useful in placing contaminant concentrations in a national context. Trace element results are also compared against results reported in EPA's Environmental Monitoring and Assessment Program (EMAP). The EMAP whole fish results for 167 lakes in the northeastern portion of the United States (New England states, New York, New Jersey) were recently reported by Yeardley *et al.* (1998). In the northeastern EMAP, between 1992 and 1994, six species of warm-water fish (e.g., largemouth bass, yellow perch) and 5 species of cold-water fish (e.g., brook trout, brown trout) were collected throughout the region and analyzed for 11 trace elements.

Other regional sources used for comparative purposes included fish tissue contaminant residue data from Massachusetts, Connecticut, and New Hampshire (USFWS, unpublished data). State data sets that were used include mercury results reported by Stafford (1994), studies reported in the scientific

literature (Friant 1979, Haines 1983), and tissue investigations by the Maine Department of Environmental Protection (DiFranco *et al.* 1995, Sowles *et al.* 1996) and the USFWS (Mierzykowski *et al.* 1997).

Contaminant concentrations in fish or mussels from highly contaminated sites reported in the scientific literature are used to illustrate highly elevated values. Contaminant concentrations reported on a dry weight basis in any of these sources were converted to wet weight based on 75% moisture. The values reported in these various studies include many different species and sizes, fillet and wholebody concentrations, and fish collected from contaminated and uncontaminated sites. Overall, these different data sets are presented only for comparative purposes. For example, the geometric mean and 85th percentile concentrations reported in the NCBP have no regulatory significance or meaning with respect to potential hazard to fishery resources (May and McKinney 1981). They serve as reference points to distinguish elevated contaminant concentrations in fish. Our compilation of concentrations from regional, state, and literature sources should be similarly viewed.

The potential toxicological risk the tissue contaminant level may have on these fish or mussels is *qualitatively* noted in the discussion section. Brief notes regarding some contaminant concentrations and FDA Action or Tolerance Levels or Maine health advisories are also included for context. Our use of FDA Action levels or state advisories for comparative purposes should not be considered an assessment of risk to humans. Similarly, our qualitative remarks on the potential threat to ecological receptors should not be considered an ecological risk assessment. A separate assessment of our data would be necessary to determine the human health or ecological risk implications under the provisions and regulations of the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund). This study will be provided to risk assessors of EPA and the Maine Department of Environmental Protection, who may provide a more detailed evaluation of the potential human health and ecological risks associated with the consumption of fish from Meddybemps Lake or the Dennys River under the Superfund law.

6.1 Fish

Smallmouth bass, brook trout, and pumpkinseed were analyzed in this study because they are popular sportfish species, often consumed by anglers, and were present in numbers during sampling. All bass and trout analyzed were at or above the minimum legal angling length. There is no minimum legal length for pumpkinseed or other sunfish in Maine; however they too are popular sportfish for shore anglers and children fishing from camp docks. Young or novice anglers and many adults or experienced anglers often catch and eat sunfish of all sizes.

The fish species used in this study also represent different trophic levels in aquatic systems. Adult smallmouth bass are primarily piscivorous, feeding on smaller fish or on crayfish (Edwards *et al.* 1983). In many Maine lakes and rivers, smallmouth bass are upper trophic level predators. Pumpkinseed are benthic foragers (Fish and Savitz 1983). Brook trout are opportunistic feeders that utilize a variety of

natural prey (Power 1980) with aquatic insects typically forming the principal dietary component. Adult white sucker are benthic feeders ingesting amphipods, gastropods, and aquatic insects (Twomey *et al.* 1984).

We would not expect fish movements, particularly among lake collection sites, to significantly alter our interpretation of contaminant data. Smallmouth bass in lakes and reservoirs may have home ranges of 1.3 to 43.2 ha (3.2 - 106.7 ac; Kraai *et al.* 1991), while the range of pumpkinseed may be much smaller - between 0.23 and 1.12 ha (~0.50 - 2.75 ac; Fish and Savitz 1983). These reported home ranges of smallmouth bass and pumpkinseed in lacustrine systems are not particularly large. Since the Meddybemps Lake fish collection sites are kilometers apart, we would not expect bass or pumpkinseed home range overlap among our sampling areas. In streams, smallmouth bass may remain throughout the season within a single pool (Edwards *et al.* 1983). However, between-season movements of bass in lakes or streams (120 m/d; Todd and Rabeni 1989) in response to changes in water temperature or flow does occur and the possibility exists that bass forage within the different Dennys River collection sites. White sucker and, to a lesser extent, brook trout may move considerable distances in river systems during spawning or in response to lower flows. White sucker spawn in riffle areas from early May to early June (Scott and Crossman 1973). Fish collections for this study occurred in late September, so we would not expect the suckers sampled in the Dennys River or East Machias River to be from distant areas. Brook trout are fall spawners that also may move considerable distances in rivers or brooks to reach spawning habitat. However, if suitable spawning habitat exists in the area as it does in Dead Stream, trout movements may be limited.

The fish species in this study are also important prey of different piscivores. Mink consume sunfish and trout (Korschgen 1958). River otter prey on slow-swimming species like suckers or sunfish, and to a lesser extent on fast-swimming species such as trout (Toweill and Tabor 1982). Several bird species in the Meddybemps Lake and Dennys River area are frequent predators of the fish species in this study. The common loon will eat trout, pumpkinseed, and white sucker (McIntyre 1988, Barr 1996, Evers and Reaman 1997). Large wading birds (e.g., great blue heron) also forage on sunfish and suckers (Bent 1926). Osprey, like the river otter, often select slow-swimming fish species like suckers when foraging (Poole 1989). Fish comprise 93 - 96% of the diet of bald eagles nesting in interior Maine (Todd 1979). A bald eagle nest (#132A) is located approximately 8-km (5 mi) from the Eastern Surplus Site, and adult and juvenile birds have been observed feeding at Meddybemps Lake. The fish species collected in this study are often taken by eagles. White sucker remains have frequently been found in Maine bald eagle nests and at perching sites (Todd 1979, Welch 1994). Smallmouth bass are another fish species also consumed by eagles. However, bass are nearly completely digested by the bird and prey remains are usually not found (Welch L. 1997. Personal communication).

6.2 Mussels

Freshwater mussels were analyzed in response to an account to EPA that a camp owner regularly consumed Meddybemps Lake mussels. In addition to providing information for human health risk

assessors, mussels are also useful forage species of wildlife receptors in ecological risk assessments and serve as bioindicators of environmental quality (Keller and Lydy 1997). Glochidia (mussel larvae) and juvenile mussels are prey of fish and aquatic birds (Martin 1997). Predators of adult mussels include the muskrat, mink, otter (Toweill and Tabor 1982) and raccoon. During sampling for this study, evidence of predation of adult mussels was found along the banks of the Dennys River and the shore of Meddybemps Lake.

The brook floater, a state-listed Special Concern species, occurs in the East Machias River and has been found historically in the Dennys River (McCollough and Schwartz 1997). None were found during our collections. However, eastern elliptio and alewife floater were common species encountered in the study area and they were used as surrogate bioindicators of environmental contamination. Their tissue concentrations are useful for assessing the potential for contaminant uptake by the rarer brook floater.

6.3 Trace elements

Arsenic (As) - Arsenic is a teratogen and carcinogen, which bioconcentrates in organisms, but does not biomagnify in food chains (Eisler 1994). In toxicity tests, early life stages of fish (muskellunge, *Esox masquinongy*) were particularly vulnerable to arsenic (Spotila and Paladino 1979). In unpolluted or mildly-contaminated waters, fish tissue may contain As residues ranging between < 0.1 and 0.4 ：g/g (Moore and Ramamoorthy 1984b). Fish exposed to high concentrations of arsenic in water can accumulate the contaminant in tissue over a short period of time. Green sunfish (*Lepomis cyanellus*) placed in water with an arsenic concentration of 100 mg/L had tissue concentrations of 33.4 ：g/g after 46 hours (Sorensen 1976). Arsenic readily accumulates in fish, particularly in the liver and skin (Oladimeji *et al.* 1984). Spehar *et al.* (1980) suggested that fish may have the ability to metabolize arsenic more efficiently than lower food chain organisms. There is limited information on the potential effects of arsenic accumulation by freshwater fish. Gilderhus (1966) reported that immature bluegills (*Lepomis macrochirus*) with tissue residues greater than 1.3 ：g As/g experienced diminished growth and survival. Dietary exposure to arsenic (7.5 ：g/g) also reduced growth in rainbow trout (Oladimeji *et al.* 1984).

The NCBP (Schmitt and Brumbaugh 1990) geometric mean As concentration is 0.14 ：g/g and the 85th percentile is 0.27 ：g/g. The EMAP (Yeardley *et al.* 1998) mean As concentration for fish in 105 northeastern U.S. lakes is 0.08 ：g/g (range: 0.01 - 0.55 ：g/g). The mean As concentration in Meddybemps Lake reconstructed wholebody smallmouth bass collected adjacent to the Eastern Surplus Site (0.32 ：g/g) and Fowler Point (0.32 ：g/g), and in wholebody pumpkinseed sampled near the Eastern Surplus Site (0.30 ：g/g) and at Staples Cove (0.33 ：g/g) exceeded the NCBP 85th percentile concentration. In reconstructed wholebody smallmouth bass taken from the deadwater reach (0.29 ：g/g) of the Dennys River, in reconstructed wholebody brook trout from the Dead Stream/Dennys River confluence (0.24 ：g/g), and in wholebody white sucker from the East Machias River (0.34 ：g/g), mean As concentrations also exceeded the NCBP 85th percentile. Arsenic levels

higher than the NCBP geometric mean and EMAP mean concentrations were found in reconstructed wholebody smallmouth bass from the East Machias River (0.22 ：g/g) and from Staples Cove (0.20 ：g/g) in Meddybemps Lake.

Although arsenic in Meddybemps Lake, the Dennys River, and East Machias River was elevated compared to the EMAP mean, NCBP geometric mean, and NCBP 85th percentile concentrations, the fish tissue concentrations are well below the 1.3 ：g/g adverse effect level cited by Gilderhus (1966). There does not appear to be a distinct pattern of As contamination between fish collected adjacent to the Eastern Surplus Site in Meddybemps Lake and the Dennys River and fish sampled at the reference locations.

Mussels analyzed in this study had much higher concentrations of As than did fish. However, few studies describing As concentrations in freshwater mussel tissue were located for comparative purposes, and it is difficult to put the concentrations in Meddybemps Lake, the Dennys River, and East Machias River into context. The highest As level in mussel tissue was found in the composite sample of alewife floaters from Fowler Point (0.99 ：g/g) in Meddybemps Lake and lowest in the eastern elliptio sample from Staples Cove (0.52 ：g/g). Mussel samples from the Dennys and East Machias Rivers range from 0.68 ：g/g to 0.75 ：g/g. These levels do not appear to be exceedingly high. For example, in the NOAA Mussel Watch Project (O'Connor and Beliaeff 1995), arsenic concentrations in mollusks sampled from 1986 to 1993 in marine, estuarine, and Great Lake areas ranged from 2.1 to 2.6 ：g/g. In some marine systems, mussels may contain As concentrations that range from 2 to 20 ：g/g (Eisler 1994) and reach as high as 30 ：g/g (Gorby 1994).

Cadmium (Cd) - Cadmium is a teratogen, possible carcinogen, and probable mutagen, that has been implicated as the cause for severe effects in fish and wildlife (Eisler 1985a). In humans, chronic exposure to Cd can lead to kidney dysfunction (FDA 1993a). Vertebrate species with wholebody concentrations of 2.0 ：g/g likely indicate Cd contamination (Eisler 1985a). Animals with Cd tissue concentrations greater than 5 ：g/g may be lethally affected by Cd, while higher tissue concentrations of 15.0 ：g/g could be hazardous to the upper trophic level species that prey on these animals (Eisler 1985a). Spry and Wiener (1991) reported that Cd does not increase with fish age or size, does not biomagnify in aquatic food chains, and primarily accumulates in gill, kidney, and liver tissue. Consequently, wholebody concentrations are useful bioindicators of fish exposure to Cd (Cope *et al*. 1994). In highly contaminated areas, Cd in wholebody fish may be as high as 3 ：g/g (Murphy *et al*. 1978). In uncontaminated areas, wholebody Cd levels in fish may range from 0.02 to 0.09 ：g/g (Murphy *et al*. 1978).

The NCBP (Schmitt and Brumbaugh 1990) geometric mean Cd concentration is 0.03 ：g/g and the 85th percentile is 0.05 ：g/g. The EMAP (Yeardley *et al*. 1998) mean Cd concentration for fish in 105 northeastern U.S. lakes is 0.02 ：g/g (range: 0.004 - 0.08 ：g/g). Cadmium was infrequently detected in bass samples from the Dennys River or Meddybemps Lake. Cadmium concentrations in reconstructed wholebody Meddybemps Lake smallmouth bass collected near the Eastern Surplus Site

range from non-detect to 0.03 ：g/g, while bass from the Dennys River locations range from non-detect to 0.04 ：g/g. In East Machias River reconstructed wholebody bass, Cd concentrations range from non-detect to 0.05 ：g/g. Cadmium was detected in most of the wholebody pumpkinseed samples from Meddybemps Lake (13 of 15), in all the East Machias River wholebody white sucker samples, and in 11 of 15 white sucker samples from the Dennys River. Overall, Cd concentrations were not higher in fish collected near the Eastern Surplus Site, and the concentrations, except in two instances (a pumpkinseed from Staples Cove with 0.06 ：g As/g and a reconstructed wholebody smallmouth bass from the East Machias River with 0.05 ：g As/g), do not exceed the NCBP 85th percentile.

Cadmium is markedly higher in mussel tissue samples than in fish. The highest Cd concentration (0.72 ：g/g) was recorded in the eastern elliptio East Machias River composite sample taken above the Route 191 bridge in Jacksonville. In contrast, Cd concentrations were lower in Meddybemps Lake mussel samples (Θ 0.42 ：g/g, range: 0.27 - 0.51 ：g/g) and Dennys River samples (Θ 0.49 ：g/g). In several other freshwater mussel tissue studies, Cd concentrations from 0.13 ：g/g to 2.8 ：g/g have been reported (Anderson 1977, Manly and George 1977, Servos *et al*. 1987,Czarnezki 1987, V.-Balogh 1988, Naimo *et al*. 1992). The Cd concentrations in mussels from Meddybemps Lake and the river sites do not appear to be usual or highly elevated compared to these other studies.

Moore and Ramamoorthy (1984b) stated that some regulatory standards restrict human consumption of fish with Cd residues in excess of 0.5 ：g/g. Yeardley et al (1998) reported critical fish Cd values for human consumption that ranged from 0.1 to 1.0 ：g/g. Cadmium was not detected in any smallmouth bass or brook trout fillet samples. Cadmium concentrations in mussel tissue, however, may be a potential hazard for some consumers.

Chromium (Cr) - Trivalent Cr is an essential trace element for vertebrates. The hexavalent form of Cr, however, may cause adverse effects in the liver and kidney, and could also be a carcinogen (FDA 1993b, Environment Canada and Health Canada 1994). In the laboratory, Cr is a mutagen, carcinogen, and teratogen to several organisms (Eisler 1986b). Chromium bioaccumulates in fish gills, liver, and kidneys (Holdway 1988). In heavily contaminated areas, biota may accumulate high levels of Cr. Freshwater snails from the Sebasticook River in central Maine contained 22 to 440 ：g Cr/g, dry weight (Duval *et al*. 1980).

Chromium was not included in the NCBP. The EMAP (Yeardley *et al*. 1998) mean Cr concentration for fish in 105 northeastern U.S. lakes is 0.19 ：g/g (range: 0.03 - 1.46 ：g/g). Values reported in the scientific literature and field studies are also presented for comparative purposes. Average Cr concentrations in freshwater fish muscle may be less than 0.25 ：g/g (Moore and Ramamoorthy 1984b). Levels of Cr in fish from 14 Ontario lakes averaged 0.23 ：g/g, with a range of 0.19 to 0.27 ：g/g (Johnson 1987). In Maine (Sowles *et al*. 1996), Cr in wholebody fish of several species from 35 locations ranged from 0.04 to 0.84 ：g/g. In an earlier Meddybemps Lake/Dennys River fish tissue investigation, Cr concentrations in white sucker from the Dennys River reportedly ranged from 1.7 to 2.5 ：g/g (Frakes 1987). In our study, reconstructed wholebody smallmouth bass collected in

Meddybemps Lake adjacent to the Eastern Surplus Site (Θ 0.26 ∶g/g) had lower Cr concentrations than fish collected from Fowler Point (Θ 0.85 ∶g/g) or Staples Cove (Θ 0.35 ∶g/g). Similarly, reconstructed smallmouth bass taken from the East Machias River reference area (Θ 0.66 ∶g/g) had higher concentrations of Cr than bass (Θ 0.32 ∶g/g) or trout (Θ 0.24 ∶g/g) from the Dennys River. These Cr concentrations appear to be within the upper end of the ranges reported by Sowles *et al* (1996) and Yeardley *et al*. (1998). The levels in our study are not abnormally high, suggesting that the Eastern Surplus Site may not be a significant Cr source to the watershed.

Chromium concentrations in mussel tissue were lower than fish tissue, ranging from 0.24 ∶g/g at the Staples Cove Meddybemps Lake reference site to 0.62 ∶g/g at the Dennys River collection location (ES02AF) below the Route 191 bridge in Meddybemps.

Copper (Cu) - Copper is an essential element for vertebrates, and commonly found in fish tissue. Early life stages of salmonids are susceptible to waterborne Cu and teratogenic effects including lordosis, soliosis, kyphosis, and rigid coiling of the vertebral column (Birge and Black 1979) may result from exposure. Freshwater fish can regulate Cu over a wide range of concentrations, but will accumulate copper in excess of nutritional requirements if continually exposed to the element (Leland and Kuwabara 1985). Moore and Ramamoorthy (1984b) suggested that even in polluted waters, fish muscle tissue concentrations seldom exceed 1 ∶g Cu/g. They also surmised that contaminated food is probably a more important source of copper than water. In New England, Cu concentrations above 1 ∶g/g in fish tissue are not unusual.

The NCBP (Schmitt and Brumbaugh 1990) geometric mean Cu concentration is 0.65 ∶g/g, the 85th percentile is 1.0 ∶g/g, and the maximum is 23.1 ∶g/g. The EMAP (Yeardley *et al*. 1998) mean Cu concentration for fish in 167 northeastern U.S. lakes is 0.89 ∶g/g (range: 0.06 - 21.84 ∶g/g). Reconstructed wholebody Cu concentrations in bass at the Meddybemps Lake Eastern Surplus Site (0.93 ∶g/g), in brook trout at the Dennys River Dead Stream location (0.94 ∶g/g), and in wholebody white sucker from the East Machias River (0.79 ∶g/g) were higher than the NCBP geometric mean, but lower than the 85th percentile concentration. Although Cu appears to be significantly higher in Meddybemps Lake fish collected near the Eastern Surplus Site, the levels in fish tissue are not usually high for the region. Copper concentrations in wholebody centrarchids and percids collected in field studies by the U.S. Fish and Wildlife Service (unpublished data) in Connecticut, Massachusetts, and Maine range from 0.30 to 55 ∶g/g. In another Maine Superfund fish tissue study (Mierzykowski *et al*. 1997), Cu concentrations in wholebody brook trout averaged 1.77 ∶g/g, range: 0.88 - 3.22 ∶g/g.

Copper was detected in all but three fish fillet samples. Copper in fish fillets was significantly higher in samples collected adjacent to the Eastern Surplus Site than in reference locations. The highest concentration of Cu detected in smallmouth bass (max. 2.28 ∶g/g) are elevated compared to other New England centrarchid fish tissue studies. Mean Cu concentrations in smallmouth bass fillets from Meddybemps Lake (0.46 ∶g/g), the Dennys River (0.44 ∶g/g), and the East Machias River (0.37 ∶g/g) are also higher than bass fillet concentrations (n = 14, Θ 0.26 ∶g/g, 0.19 - 0.56 ∶g/g) reported

by the Maine Department of Environmental Protection (Sowles *et al*. 1996). The range and mean of Cu in 5 brook trout fillets (range: 0.30 - 0.48 ：g/g, Θ 0.38 ：g/g) from the Dead Stream/Dennys River confluence are slightly higher than the range and mean of 6 brook trout fillets analyzed by the Maine Department of Environmental Protection (Sowles *et al*. 1996; range: 0.18 - 0.40 ：g/g, Θ 0.28 ：g/g).

Copper concentrations in mussel tissue samples ranged from 0.52 ：g/g to 1.40 ：g/g. The lowest Cu levels were found in samples (lake and river) collected adjacent to the Eastern Surplus Site. Copper does not appear to be a major contaminant of concern for adult mussels. Kraak *et al*. (1993) found that freshwater mussels had the ability to regulate Cu within limited ranges. They also reported a nominal Cu tissue concentration of 3.4 ：g/g in their control locations. In the River Thames, Manly and George (1977) reported Cu concentrations ranging from 2.05 to 62.5 ：g/g in *Anodonta anatina*. In Quebec, Tessier *et al*. (1984) found Cu levels in eastern elliptio ranging from 3.4 ：g/g to 14.77 ：g/g. Overall, the Cu levels in Meddybemps Lake, the Dennys River, and East Machias River do not appear to be elevated compared to literature data.

Mercury (Hg) - Mercury is a mutagen, teratogen, and carcinogen which bioconcentrates in organisms and biomagnifies through food chains (Eisler 1987). Upper trophic level, long-lived, piscivorous fish species, such as bass (Stafford and Haines 1997) or species at the top of extended food chains (Cabana *et al*. 1994), typically have higher Hg concentrations than lower trophic species (Akielaszek and Haines 1981). Methylmercury, an organic form of mercury, is a potent neurotoxin that accounts for over 95% of the total Hg in adult fish tissue (Grieb *et al*. 1990). Mercury accumulates in the axial muscle tissue (i.e., fillet) of fish (Schmitt and Finger 1987). Wholebody concentrations of 1-5 ：g Hg/g may have chronic effects in trout, while concentrations of 10-20 ：g/g could be lethal (Niimi and Kissoon 1994). Piscivorous birds and mammals are also at risk from Hg in fish tissue. Barr (1986) reported that loons feeding on fish with Hg concentrations of 0.30 to 0.40 ：g/g appeared to have impaired reproduction. Mercury can be lethal to mink at dietary concentrations of 1.1 ：g/g (Kucera 1983) and to river otter (*Lutra canadensis*) at dietary concentration above 2 ：g/g (O'Connor and Nielsen 1980).

The NCBP (Schmitt and Brumbaugh 1990) geometric mean Hg concentration is 0.10 ：g/g and the 85th percentile is 0.37 ：g/g. The EMAP (Yeardley *et al*. 1998) mean Hg (reported as MeHg, methylmercury) concentration for fish in 167 northeastern U.S. lakes is 0.18 ：g/g (range: 0.01 - 2.93 ：g/g). In Meddybemps Lake, reconstructed wholebody bass from the Eastern Surplus Site (0.18 ：g/g) appear to have lower Hg concentrations than fish from Fowler Point (0.24 ：g/g) or Staples Cove (0.28 ：g/g). These levels in Meddybemps Lake bass are higher than the NCBP geometric mean, but lower than the 85th percentile. In an earlier study conducted by the Maine DEP (DiFranco *et al*. 1995), Hg in Meddybemps Lake wholebody smallmouth bass was 0.21 ：g/g, while the mean for smallmouth bass in 17 Maine lakes was 0.63 ：g Hg/g. Over the last 4 years, Hg concentrations in Meddybemps Lake bass appear unchanged. If Hg results from all three Meddybemps Lake bass collection locations in the 1997 USFWS study are combined, the mean Hg concentration in

reconstructed wholebody smallmouth bass, 0.23 ∶g/g, is essentially the same as the 1993 MEDEP result - 0.21 ∶g/g. In the Dennys and East Machias River, Hg levels in reconstructed wholebody bass were higher than bass from Meddybemps Lake. However, the mean Hg levels in Dennys River (0.32 ∶g/g) or East Machias River (0.364 ∶g/g) bass are not higher than the NCBP 85th percentile or the statewide mean for smallmouth bass reported by DiFranco *et al* (1995). Substantially lower levels of Hg were found in wholebody pumpkinseed (0.08 ∶g/g) from Meddybemps Lake and wholebody white sucker from the Dennys River (0.10 ∶g/g) and East Machias River (0.11 ∶g/g). Reconstructed wholebody brook trout from the confluence of the Dennys River and Dead Stream have the lowest Hg concentration (Θ 0.07 ∶g/g, range: 0.06 - 0.10 ∶g/g) of the four fish species analyzed in this study. These wholebody white sucker and reconstructed wholebody brook trout Hg levels are lower than concentrations reported in the Maine REMAP fish study. In that study, DiFranco *et al.* (1995) surveyed 111 white sucker lakes and 28 brook trout lakes, and found Hg wholebody levels of 0.24 ∶g/g and 0.40 ∶g/g, respectively.

Mercury is a potential contaminant of concern for piscivorous wildlife receptors in the study area. Eisler (1987) recommended a fish Hg concentration of 0.10 ∶g/g for the protection of sensitive piscivorous birds and mammals. As noted above, the Hg levels in reconstructed wholebody smallmouth bass from Meddybemps Lake, the Dennys River, and the East Machias River exceed this protection limit. The reconstructed wholebody bass Hg levels are also within the loon reproductive effect concentration range suggested by Barr (1986), 0.30 - 0.40 ∶g/g. Unfortunately, the Hg levels in fish from Meddybemps Lake and the two rivers are not unusual. Mercury is a widespread contaminant in New England. The Hg levels in fish tissue reported here are elevated compared to recommended protection criteria, but they are not particularly high for the region. The Eastern Surplus Site does not appear to be a contributing source to mercury contamination in the Meddybemps Lake/Dennys River watershed.

The FDA Action Level for mercury in fish is 1.0 ∶g/g (FDA 1992), and none of the fish fillet samples analyzed in this study exceeded the FDA action level. Several states, including Maine, have adopted lower action levels for the protection of human health. Maine has a fish consumption advisory threshold level of 0.43 ∶g Hg/g (Maine Department of Human Services 1997). Even lower levels or expanded consumption advisories have also been adopted because of mercury for vulnerable receptor groups such as pregnant women and children. These receptor groups are often advised to avoid eating <u>any</u> fish from many lakes and rivers (EPA 1995). The mean Hg concentrations in smallmouth bass fillets from Meddybemps Lake, the Dennys River, and East Machias River are 0.31 ∶g/g, 0.45 ∶g/g, and 0.41 ∶g/g, respectively. These Hg fillet concentrations are not unusual. In a statewide study of Hg contamination, Stafford (1994) reported a mean level in smallmouth bass fillets of 0.67 ∶g/g. Although fish in this study have lower Hg fillet concentrations than the statewide average, it is inappropriate to assume that fish from Meddybemps Lake or the two rivers are safe for all human consumers. This determination can only be made after a site-specific evaluation by human health risk assessors of MEDEP and the EPA.

Mercury was not detected in mussel samples collected adjacent to the Eastern Surplus Site in Meddybemps Lake or in the Dennys River. The two northerly Meddybemps Lake sampling locations, Staples Cove and Fowler Point, had Hg concentrations of 0.03 ：g/g and 0.04 ：g/g, respectively. The highest Hg concentration in a mussel composite sample (0.104 ：g/g) was collected from the East Machias River, the riverine reference location. These Hg concentrations do not appear to be highly elevated compared to other studies. In a 1995 contaminant survey of the Sudbury River watershed in Massachusetts (USFWS, unpublished data), Hg concentrations in 33 eastern elliptio samples ranged from 0.03 ：g/g to 0.23 ：g/g with an overall mean of 0.09 ：g/g. In a Minnesota study, Naimo et al. (1992) found Hg levels as high as 0.48 ：g/g in the threeridge mussel, *Amblema plicata*, while Malley *et al.* (1996) reported a composite wholebody concentration of 0.09 ：g Hg/g in giant floater *Pyganodon grandis* from northwestern Ontario.

Nickel (Ni) - Relatively little information regarding the effects of elevated Ni body burdens on fish and wildlife is available. Nickel does not concentrate through the food chain (Moore and Ramamoorthy 1984b). However, Ni occurring in the tissues of some piscivorous bird species may reflect metal concentrations in prey items. For example, Custer *et al.* (1986) in a Rhode Island study of common terns (*Sterna hirundo*) found the highest Ni concentrations in tern liver tissue (up to 0.25 ：g/g) where the main prey item, killifish (*Fundulus* spp.), also had the highest Ni concentration (0.52 ：g/g). Outridge and Scheuhammer (1993) suggested that mammals and birds may have the ability to regulate Ni assimilation at dietary concentrations up to 25 ：g/g. They also reported that chronic Ni exposure at dietary concentrations of 10 - 50 mg/kg body weight/day may reduce growth and survival in mammals.

Nickel was not included in the NCBP. The EMAP (Yeardley *et al.* 1998) mean Ni concentration for fish in 167 northeastern U.S. lakes is 0.21 ：g/g (range: 0.05 - 0.97 ：g/g). Jenkins (1980) suggested a preliminary estimate of Ni in freshwater fish from uncontaminated areas of < 0.2 to 2.0 ：g/g, but cautioned that more data were needed. Nickel was infrequently detected in fish samples from Meddybemps Lake, the Dennys River, and East Machias River. Except for one smallmouth bass and one white sucker from the East Machias River with reconstructed wholebody or wholebody concentrations of 0.45 ：g/g and 0.33 ：g/g, respectively, Ni levels in whole fish do not exceed 0.20 ：g/g. Tissue concentrations of Ni in Meddybemps Lake, the Dennys River, and East Machias River whole fish are at the lower end of the range suggested by Jenkins (1980). Since reconstructed wholebody and wholebody fish tissue Ni levels are also well below the wildlife receptor dietary assimilation level (25 ：g/g) reported by Outridge and Scheuhammer (1993), Ni should not be a contaminant of concern to fish or to wildlife receptors in the study area.

Few studies were located that reported Ni concentrations in mussels. Jenkins (1980) suggested a preliminary estimate of Ni in mollusks from uncontaminated areas of 0.4 ：g/g to 2.0 ：g/g, but cautioned that more data were needed. He also reported a maximum mollusk concentration of 191 ：g Ni/g. Manly and George (1977) reported Ni levels ranging from 0.02 ：g/g to 11.48 ：g/g in *Anodonta anatina* from the River Thames. In our study, Ni concentrations in mussel tissue samples range from 0.06 ：g/g in Meddybemps Lake near the Eastern Surplus Site to 0.46 ：g/g in the East

Machias River near the Route 191 bridge in Jacksonville. These levels are within the suggested "uncontaminated" range of Jenkins (1980) and well below the higher level reported by Manly and George (1977) and the maximum reported by Jenkins (1980).

Lead (Pb) - Lead is an ubiquitous environmental contaminant that is commonly found in fish and wildlife tissues, particularly in species with habitats proximal to roads and urban or industrial developments. Lead is bioconcentrated, but does not appear to magnify through food chains (Eisler 1988). Exposure to Pb may cause neurological effects, kidney disfunction, and anemia in vertebrates (Leland and Kuwabara 1985). Lead is known to inhibit *-aminolevulinic acid dehydratase (ALAD) activity, an enzyme necessary for hemoglobin synthesis, and to elevate protoporphyrin concentrations (Henny *et al.* 1991). Adverse Pb effects on aquatic biota can include reduced survival, impaired reproduction, impaired function of the liver, kidney, and spleen, reduced growth, and spinal deformities (Holcombe *et al*. 1976, Eisler 1988). Lead accumulation varies among fish species, and concentrations do not appear to be related to size (Czarnezki 1985). Lead is concentrated at higher levels in calcified or hard tissue (i.e., bone, skin, scales) than in muscle and other soft tissues (Patterson and Settle 1976). Because Pb is more likely to accumulate in bone, Pb exposure may be limited by piscivorous birds that cast pellets containing partially digested or undigested bone of their prey (Henny *et al.* 1994).

The NCBP (Schmitt and Brumbaugh 1990) geometric mean Pb concentration is 0.11 ∶g/g and the 85th percentile is 0.22 ∶g/g. The EMAP (Yeardley *et al*. 1998) mean Pb concentration for fish in 167 northeastern U.S. lakes is 0.09 ∶g/g (range: 0.01 - 1.48 ∶g/g). Lead was infrequently detected in reconstructed wholebody bass from Meddybemps Lake (3 of 15), Dennys River (none), and the East Machias River (1 of 6). When detected, Pb concentrations in reconstructed wholebody bass are similar (0.09 - 0.12 ∶g/g) to the NCBP geometric mean and somewhat higher than the mean in a MEDEP fish survey. In that survey of 17 Maine bass lakes (DiFranco *et al.* 1995) which included Meddybemps Lake, wholebody smallmouth bass had a mean Pb concentration of 0.07 ∶g/g (range: 0.03 - 0.15 ∶g/g). Lead concentrations in other fish species from Meddybemps Lake and the two rivers are also low. Brook trout collected from the confluence of Dead Stream and the Dennys River did not have detectable concentrations of lead in fillet or carcass samples. In wholebody pumpkinseed and white sucker, Pb was also rarely detected. Lead concentrations in two (of 15) pumpkinseed at 0.14 ∶g/g and 0.18 ∶g/g were above the NCBP geometric mean and below the 85th percentile. Two wholebody white sucker from the Dennys River had Pb concentrations of 0.14 ∶g/g and 0.11 ∶g/g. Lead was not detected in the other 13 fish samples. In the East Machias River, only one wholebody white sucker (0.12 ∶g/g) of the 6 collected had a detectable level of Pb. White sucker were included in the fish survey reported by DiFranco *et al.* (1995). The mean Pb concentration in wholebody white sucker from 111 Maine lakes was 0.15 ∶g/g (range: 0.03 - 0.64 ∶g/g).

The Pb levels found in fish from Meddybemps Lake, the Dennys River, and East Machias River are not highly elevated compared to the results reported by DiFranco *et al.* (1995) or compared to grossly contaminated areas. For example, in the Coeur d'Alene River in Idaho, highly elevated concentrations of Pb were reported in bullhead (21.6 ∶g/g) and yellow perch (3.1 ∶g/g) whole fish composite

samples, and largemouth bass had a mean Pb concentration of 0.75 ：g/g (Henny *et al*. 1991).

There is no FDA Action Level for Pb in fish tissue, but a concentration of 0.3 ：g/g has been developed by the World Health Organization as an upper permissible limit for Pb in foods (Settle and Patterson 1980). Yeardley *et al*. (1998) reported a Pb critical fish tissue value for human consumption of 0.5 ：g/g. In our study, Pb was found in only 2 of 36 fillet samples, both were bass from Meddybemps Lake sites. The concentrations of 0.13 ：g/g and 0.22 ：g/g are not elevated compared to the WHO level or the critical value reported by Yeardley *et al*. (1998).

Lead has been measured in several freshwater mussel studies. For example, Manly and George (1977) found Pb concentrations ranging from 0.02 ：g/g to 33.55 ：g/g in mussels from the River Thames, while Anderson (1977) reported Pb concentrations ranging from 4.41 ：g/g to 12.04 ：g/g in four species of freshwater clams. The Pb levels in mussels from Meddybemps Lake and the two rivers range from 0.19 ：g/g to 0.79 ：g/g.

Selenium (Se) - Selenium contamination in drainwater and surface water is a serious problem to fish and wildlife resources in the western United States, a region with seleniferous soils. In the eastern United States seleniferous soils are less common, but Se has been identified in the Northeast as an environmental contaminant in fish collected from rivers in industrialized areas. Selenium is an essential trace element for vertebrates. Nominal dietary intake of Se by rainbow trout (*Oncorhynchus mykiss*) is approximately 0.07 ：g/g (Hilton *et al*. 1980). Selenium deficiency may cause death (Eisler 1985b). Elevated intake of Se can also be harmful. Fish consuming diets with 10 to 33 ：g Se/g have experienced toxic effects (Hilton *et al*. 1980, Besser *et al*. 1993). Excessive amounts may be lethal, cause reproductive abnormalities or failure, result in tissue damage, retard growth, or eliminate entire fish communities (Eisler 1985b, Lemly 1996). In one study, bluegill with tissue concentrations of 7.94 ：g Se/g had reproductive problems (Gillespie and Baumann 1986). Reproductive effects or mortality may occur in fish and waterfowl foraging on prey items with Se concentrations ranging from 0.75 to 1.25 ：g/g (Lemly and Smith 1987).

The NCBP (Schmitt and Brumbaugh 1990) geometric mean Se concentration is 0.42 ：g/g and the 85th percentile is 0.73 ：g/g. The EMAP (Yeardley *et al*. 1998) mean Se concentration for fish in 105 northeastern U.S. lakes is 0.37 ：g/g (range: 0.11 - 1.41 ：g/g). In various parts of the Great Lakes, Hodson (1990) reported that whole fish generally had Se concentrations less than 1 ：g/g (range: 0.10 - 1.55 ：g/g). Reconstructed wholebody smallmouth bass and trout from Meddybemps Lake, the Dennys River, or the East Machias River do not have elevated levels of Se. A bass taken from the deadwater reach of the Dennys River had the highest reconstructed wholebody Se concentration with 0.37 ：g/g, a level below the NCBP geometric mean. None of the wholebody pumpkinseed had detectable levels of Se, and only one white sucker in the Dennys River had a detectable level of Se (0.10 ：g/g). The Se concentrations in fish tissue are below the range suggested by Lemly and Smith (1987) to possibly cause reproductive effects in fish and wildlife.

Selenium concentrations exceeding 1 ：g/g in fish tissue may be a problem for human consumers (Fan *et al*. 1988). Yeardley *et al* (1998) reported critical fish Se values for human consumption that ranged from 2.0 to 10 ：g/g. None of the Se concentrations in smallmouth bass or brook trout fillet samples from Meddybemps Lake or the rivers is greater than 0.42 ：g/g.

Selenium was detected in 4 of the 6 mussel composite samples. The Se concentration in the East Machias River mussel sample is highest (0.34 ：g/g), while the levels in Meddybemps Lake and the Dennys River are between 0.12 ：g/g and 0.23 ：g/g.

Zinc (Zn) - Zinc is an essential element for vertebrates. Although it is an uncommon occurrence in aquatic systems, fish with diets deficient in Zn can experience reduced growth and increased mortality (Spry *et al*. 1988). Generally, Zn is efficiently regulated by wildlife and tissue concentrations are not reliable indicators of exposure (Beyer and Storm 1995). Spry *et al*. (1988) found no toxic effects in rainbow trout from exposure to high dietary and waterborne concentrations of Zn based on growth, mortality, major plasma ions, hematocrit, or plasma protein. However, Eisler (1993) reported that elevated concentrations of waterborne Zn have adverse effects on growth, survival, behavior, and reproduction of sensitive fish, with early life stages being the most sensitive.

The NCBP (Schmitt and Brumbaugh 1990) geometric mean Zn concentration is 21.7 ：g/g and the 85th percentile is 34.2 ：g/g. The EMAP (Yeardley *et al*. 1998) mean Zn concentration for fish in 167 northeastern U.S. lakes is 21.1 ：g/g (range: 8.8 - 63.7 ：g/g). In a study of Cd and Zn from an industrially-contaminated lake, Murphy *et al*. (1978) reported Zn concentrations ranging from 34.7 to 56.2 ：g/g and 19.7 to 29.7 ：g/g for bluegill and largemouth bass, respectively. Citing several sources, Murphy *et al*. (1978) reported average Zn whole fish concentrations from uncontaminated areas ranging from 12 ：g/g to 43 ：g/g. The highest mean Zn concentration in our study were found in reconstructed wholebody brook trout (Ø 20.10 ：g/g) from the Dead Stream/Dennys River confluence, a level below the NCBP geometric mean. Zn concentrations in other fish species (wholebody or reconstructed wholebody), by descending order are: Meddybemps Lake pumpkinseed (19.51 ：g/g), Dennys River white sucker (18.4 ：g/g), East Machias River white sucker (18.3 ：g/g), Dennys River smallmouth bass (15.3 ：g/g), and Meddybemps Lake smallmouth bass (14.2 ：g/g). Based on these results, Zn does not appear to be a contaminant of concern in wholebody fish.

Mean Zn concentrations in smallmouth bass fillets are 4.14 ：g/g (range: 3.44 - 5.46 ：g/g) in the Dennys River, 3.88 ：g/g (range: 3.28 - 4.47 ：g/g) in the East Machias River and 3.84 ：g/g (range: 3.09 - 5.36 ：g/g) in Meddybemps Lake. These levels are similar to the results reported by Sowles *et al.* (1996) for 14 bass rivers and streams in Maine. In their study, the mean Zn concentrations in smallmouth bass fillets was 5.19 ：g/g (range: 4.34 - 6.34 ：g/g). In the Dennys River, brook trout fillets with a mean concentration of 10.31 ：g/g (range: 8.93 - 11.40 ：g/g) had higher levels of Zn than bass from Meddybemps Lake, Dennys River, or East Machias River. Sowles *et al.* (1996) also found higher levels of Zn in brook trout fillets (n = 6, Ø 6.94 ：g/g, range: 2.90 - 11.57 ：g/g) than smallmouth bass. Brook trout fillets from the Dennys River (Dead Stream confluence) were skin-on samples, and

hard tissue within the sample (e.g., skin, vertebrae) may partially account for the higher levels. Yeardley *et al.* (1998) reported critical fish Zn values for human consumption that ranged from 40 to 700 ：g/g. Fillets analyzed in the Eastern Surplus Study are well below this Zn range.

Generally, Zn is not a contaminant of concern in mollusks and levels may accumulate far in excess of the organism's requirements (Eisler 1993). The mussel composite sample from the East Machias River had the highest Zn concentration with 17.8 ：g/g. Lower levels were detected in the Dennys River (Θ 16.4 ：g/g) and Meddybemps Lake (Θ 14.4 ：g/g) mussel samples. These levels do not suggest a Zn contaminant problem in the two watersheds. Naimo *et al.* (1992) indicated that mussels with Zn concentrations ranging from 62.5 - 175 ：g/g are from highly polluted systems. The Zn levels in mussels from Meddybemps Lake and the two rivers are well below this "highly polluted" range.

6.4 Organochlorine Pesticides

Chlordane Compounds (*cis*-nonachlor and *trans*-nonachlor) - Chlordane was widely used since the late 1940s throughout the United States as a broad spectrum insecticide. It was regularly used for subterranean termite control. All commercial uses of chlordane were canceled in the United States in 1988 (Howard 1991). Chlordane, however, persists for years in soil, sediment and biota. The immediate toxicity of chlordane varies depending on the species and life stage, but in general can be considered moderately toxic to mammals, moderately to highly toxic to birds, and highly toxic to fish and aquatic insects (Briggs 1992, von Rumker *et al*. 1975).

Cis-nonachlor: The NCBP (Schmitt *et al.* 1990) geometric mean *cis*-nonachlor concentration is 0.02 ：g/g and the maximum is 0.45 ：g/g. *Cis*-nonachlor was detected in only three smallmouth bass from the Dennys River - one near the Eastern Surplus Site and two in the deadwater reach.. The concentrations in reconstructed wholebody bass are 0.0010 ：g/g, 0.0013 ：g/g, and 0.0012 ：g/g. These levels are well below the NCBP geometric mean.

Trans-nonachlor: In the NCBP (Schmitt *et al.* 1990) the geometric mean *trans*-nonachlor concentration is 0.03 ：g/g and the maximum is 1.00 ：g/g. In the Eastern Surplus study, *trans*-nonachlor was detected more frequently than *cis*-nonachlor in bass tissue. However, like *cis*-nonachlor, *trans*-nonachlor was not detected in brook trout, pumpkinseed, or white sucker samples. *Trans*-nonachlor concentrations, when detected, in Meddybemps Lake reconstructed wholebody smallmouth bass (n = 6, Θ 0.0009 ：g/g) were nearly half the concentration of bass from the Dennys River (n = 5, Θ 0.0015 ：g/g) and one-fourth the level in East Machias River bass (n = 3, Θ 0.0012 ：g/g). These levels are well below the NCBP geometric mean.

Total chlordane is the sum of chlordane compounds (i.e., *cis*-nonachlor + *trans*-nonachlor). In a study of smallmouth bass from 13 Maine rivers and stream, Sowles *et al.* (1996) found a mean chlordane concentration of 0.0017 ：g/g (range: 0.0007 - 0.0025 ：g/g). In the Dennys River, one bass taken near the Eastern Surplus Site (0.0028 ：g/g) and two bass from the deadwater reach (0.0028 ：g/g,

0.0031 ：g/g) had higher total chlordane concentrations than the mean and range reported by Sowles *et al.* (1996). The chlordane levels found by Sowles *et al.* (1996) are not particularly elevated. Chlordane muscle residues of 0.1 ：g/g may endanger fish health in some species (Eisler 1990). New York State proposed a fish flesh chlordane concentration of 0.37 ：g/g (cancer endpoint) and 0.50 ：g/g (non-cancer endpoint) to protect piscivorous birds (Newell *et al*. 1987). Although three Dennys River bass had total chlordane concentration higher than the levels reported by Sowles *et al.* (1996), the low frequency of detection of chlordane compounds in fish from Meddybemps Lake, the Dennys River, and the East Machias River and the relatively low concentration of total chlordane (i.e., the sum of all the chlordane compounds) compared to biological effect levels suggest that chlordane compounds may not be contaminants of concern in these waters.

The Food and Drug Administration Action Level for chlordane residues in fish muscle is 0.3 ：g/g, wet weight (FDA 1992). None of the fish fillet samples from Meddybemps Lake, the Dennys River, or East Machias River had detectable levels of chlordane.

Dieldrin - Dieldrin is a persistent insecticide that is insoluble in water and highly toxic to fish and aquatic insects (Briggs 1992). It is one of the most toxic organochlorines that has been implicated in several cases of acute poisoning in wildlife (Blus 1995). Dieldrin contamination is generally associated with pesticide applications. However, atmospheric deposition can also introduce dieldrin to remote ecosystems. In four remote lakes in Maine, Haines (1983) detected dieldrin in Age I brook trout ranging from 0.003 to 0.007 ：g/g.

The NCBP (Schmitt *et al*. 1990) geometric mean dieldrin concentration is 0.04 ：g/g and the maximum is 1.39 ：g/g. Dieldrin was detected in one reconstructed wholebody smallmouth bass from Meddybemps Lake (0.0008 ：g/g), two bass from the Dennys River deadwater (0.0011 ：g/g, 0.0012 ：g/g), two bass from the East Machias River (0.0008 ：g/g, 0.0009 ：g/g), one white sucker from the Dennys River (0.0025 ：g/g), and in all brook trout from the Dennys River/Dead Stream confluence (n = 5, 0 0.0039 ：g/g, range: 0.0032 - 0.0046 ：g/g). Compared to the NCBP geometric mean, dieldrin levels in reconstructed wholebody smallmouth bass from Meddybemps Lake and the two rivers are not elevated. The Dennys River brook trout dieldrin levels are comparable to the concentrations in trout reported Haines (1983). The dieldrin concentration in one white sucker from the Dennys River was elevated. New York State proposed a fish flesh dieldrin concentration of 0.022 ：g/g (cancer endpoint) and 0.12 ：g/g (non-cancer endpoint) to protect piscivorous birds (Newell *et al*. 1987). This single white sucker exceeded the NYS cancer endpoint criterion, but it was the only Dennys River sucker of 14 analyzed that had any detectable dieldrin.

The Food and Drug Administration Action Level for dieldrin residues in fish muscle is 0.3 ：g/g, wet weight (FDA 1992). None of the bass fillet samples from Meddybemps Lake, the Dennys River, or East Machias River had detectable levels of dieldrin. Two brook trout fillets from the Dennys River/Dead Stream confluence had dieldrin concentrations of 0.004 ：g/g, an amount far below the FDA action level.

Endosulfan II - Endosulfan, like dieldrin and chlordane, is a cyclodiene pesticide. Endosulfan II is the $ isomer of the pesticide. It is an insecticide for vegetable crops (Vershueren 1983) that in nearby drainages readily bioconcentrates in fish and other aquatic organisms (Howard 1991). Low concentrations of endosulfan in water (96-h LC_{50} 0.96 ：g/L) can be extremely toxic to aquatic organisms (Moore *et al*. 1990). Endosulfan does not appear to accumulate in warm-blooded animals (Wiemeyer 1996). Acute oral, dermal, or inhalation exposure to endosulfan, however, can cause immediate toxicity in mammals (Briggs 1992).

Endosulfan was not included in the NCBP and few studies that included endosulfan in the organochlorine analyses were found in the scientific literature. In one study of *Tilapia* in the Alexandria region of Egypt (El Nabawi *et al*. 1987), "-endosulfan ranged from 0.00004 ：g/g to 0.00012 ：g/g. Matthiesen *et al*. (1982) found elevated levels of endosulfan (0.19 ：g/g caudal muscle, 0.8 ：g/g viscera) in fish immediately following an aerial application of endosulfan to control tsetse flies in Botswana.

Endosulfan II was only found in smallmouth bass carcass samples, not in fillets. Only bass collected near the Eastern Surplus Site, in the lake (location MS) or Dennys River (adjacent to the Site or in the deadwater reach), had concentrations of endosulfan II. The contaminant was not found in brook trout (fillet or carcass), wholebody pumpkinseed, wholebody white sucker, or freshwater mussel samples. Endosulfan II was infrequently detected at low concentrations in reconstructed wholebody smallmouth bass from the Dennys River (3 of 10 fish, 0.0011 ：g/g, 0.0022 ：g/g, 0.0026 ：g/g). Three of 5 bass collected in Meddybemps Lake had endosulfan II in their tissue (reconstructed wholebody, range: 0.0009 - 0.0013 ：g/g). These results suggest that small quantities of endosulfan may be emanating from the Eastern Surplus Site. However, the frequency of detection in Dennys River bass, the non-detection of the contaminant in other species (i.e, trout, white sucker, pumpkinseed, mussels), and the low concentrations in Meddybemps Lake bass indicate that endosulfan II may not be a major contaminant of concern.
There is no FDA action level for endosulfan in fish tissue and, as noted above, the contaminant was not detected in smallmouth bass or brook trout fillet samples or freshwater mussels.

DDT Metabolites - DDT and its metabolites are persistent contaminants in the environment. Although the use of DDT in the United States was essentially discontinued in 1972 (EPA 1990), the compound and its metabolites, particularly p,p'-DDE, continue to be detected in fish and wildlife tissues. DDT metabolites are lipophilic and accumulate in lipid deposits and other fatty tissues (Moore and Ramamoorthy 1984a). Chronic exposure to sublethal concentrations of DDT metabolites and other pesticides can cause a number of adverse effects in fish including changes in morphology, behavior, biochemistry, hematology, histopathology, respiration, feeding and growth, reproduction, and development of early life stages (Murty 1986). In raptors and piscivorous birds, DDT metabolites cause eggshell thinning (Hickey and Anderson 1968). Eggs of piscivorous birds with DDE residues of 1 ：g/g have a 5% to 10% reduction in eggshell thickness, and eggshells with 18% thinning are associated with declining populations (Blus 1996). DDE was also found to thin eggshells and reduce

reproductive success in captive black ducks (Longcore *et al*. 1971) and mallards (*Anas platyrhynchos*; Heath *et al*. 1969).

The NCBP (Schmitt *et al*. 1990) geometric mean p,p'-DDD concentration is 0.06 ∶g/g. DDD was detected only once in 15 reconstructed wholebody smallmouth bass from Meddybemps Lake and the concentration of 0.0010 ∶g/g was well below the NCBP geometric mean. Similarly low concentrations and frequencies of detections of p,p'-DDD were found in reconstructed wholebody bass from the Dennys River (2 of 10 samples, max. 0.0012 ∶g/g), reconstructed brook trout from the Dennys River (2 of 5 samples, max. 0.0056 ∶g/g), reconstructed wholebody bass from the East Machias River (2 of 6 samples, max. 0.0010 ∶g/g). Wholebody white sucker from the Dennys River/Dead Stream collection location have a mean p,p'-DDD concentration of 0.0014 ∶g/g (range: nondetect - 0.0028 ∶g/g). The contaminant was not detected in white sucker collected adjacent to the Eastern Surplus Site and in the deadwater reach of the Dennys River. Wholebody pumpkinseed from Meddybemps Lake and white sucker from the East Machias River, and mussel composite samples from all locations also did not have detectable levels of p,p'-DDD. All concentrations of p,p'-DDD detected in fish tissue are well below the NCBP.

The NCBP (Schmitt *et al*. 1990) geometric mean p,p'-DDE concentration is 0.19 ∶g/g. DDE was the most common DDT metabolite found in fish tissue. Like DDD, however, the concentrations detected were considerably lower than the NCBP. Wholebody pumpkinseed from Meddybemps Lake and white sucker from the Dennys River had equivalent mean DDE concentrations - 0.0021 ∶g/g. The mean DDE concentration in reconstructed smallmouth bass from Meddybemps Lake is only 0.0054 ∶g/g, while Dennys River bass have a mean DDE concentration of 0.0068 ∶g/g. A similar mean concentration was found in East Machias River bass (0.0056 ∶g/g). Only two wholebody white sucker from the East Machias River had detectable levels of DDE (0.0010 ∶g/g, 0.0013 ∶g/g). Reconstructed wholebody brook trout from the Dead Stream/Dennys River confluence had the highest mean DDE concentration (0.0092 ∶g/g) and the highest individual sample concentration, 0.0160 ∶g/g. A concentration 12 times less than the NCBP geometric mean..

The NCBP (Schmitt *et al*. 1990) geometric mean p,p'-DDT concentration is 0.03 ∶g/g. The p,p'-DDT metabolite was only detected in 12 of 113 tissue samples. All detects were in carcass samples of smallmouth bass. The corresponding reconstructed wholebody concentration of p,p'-DDT in these fish range from 0.0008 ∶g/g to 0.0014 ∶g/g. No correlation of tissue concentrations and proximity to the Eastern Surplus Site was evident. The p,p'-DDT levels are quite low compared to the NCBP geometric mean.

The NCBP (Schmitt *et al*. 1990) geometric mean ΣDDT concentration is 0.26 ∶g/g. ΣDDT is the sum of all o,p' and p,p' DDT metabolites. Since DDT metabolites were detected at low concentrations and at low frequency in our study, ΣDDT was not calculated for every fish. Summing the fish sample with the highest DDT metabolite concentrations (brook trout sample DS02BT) gives a ΣDDT concentration of 0.02 ∶g/g. New York State proposed a fish flesh ΣDDT concentration of 0.2

: g/g to protect piscivorous birds (Newell *et al*. 1987). The GDDT levels found in Meddybemps Lake, Dennys River, and East Machias River fish do not approach the NCBP geometric mean concentration or NYS piscivorous bird protection criterion.

The Food and Drug Administration Action Level for EDDT metabolites in the edible portion of fish is 5 : g/g (FDA 1992). The State of Maine (Maine Department of Human Services 1997) advises no consumption of fish if DDT concentrations are greater than 0.256 : g/g (cancer endpoint) or 4.4 : g/g (non-cancer endpoint). Limited consumption is advised if DDT levels are between 0.064 - 0.256 : g/g (cancer endpoint) or 1.1 - 4.4 : g/g (non-cancer endpoint). p,p'-DDE was the only DDT metabolite detected in smallmouth bass fillets and it was detected infrequently and at low concentrations in Meddybemps Lake (n = 4, 0.0010 - 0.0025 : g/g), the Dennys River (n = 3, 0.0019 - 0.0023 : g/g) and the East Machias River (n = 2, 0.0011 : g/g, 0.0014 : g/g). In brook trout fillets, p,p'-DDE was detected in all fillets (0.0070 : g/g, range: 0.0017 - 0.0119 : g/g) and p,p'-DDD was detected in one sample (0.0045 : g/g). GDDT concentrations in fish fillets are well below the FDA action level and the Maine DHS advisory levels.

DDT compounds were not detected in freshwater mussel composite samples.

6.5 Polychlorinated Biphenyls (PCBs)

6.5.1 Total PCBs - PCBs are lipophilic compounds that bioconcentrate in organisms (EPA 1980), and biomagnify in food chains (Eisler 1986a). In fish, acute toxicity from PCBs is low, while chronic toxicity is relatively high (Murty 1986). PCB accumulations can adversely affect egg survival and fry development in fish (Hogan and Brauhn 1975). Niimi (1996) reported that fish from higher trophic levels in uncontaminated freshwater environments had PCB concentrations in the low : g/kg (ppb) range, while higher trophic level fish from contaminated waters had PCB levels in the low : g/g (ppm) range. In riverine systems, biomagnification of PCBs has occurred more from the ingestion of contaminated prey (i.e., trophic transfer) than uptake from water (Zaranko *et al*. 1997). Fish with tissue PCB concentrations greater than 50 : g/g may experience adverse changes in growth and reproduction (Niimi 1996). PCBs are also common contaminants in piscivorous birds and mammals. Certain mammals may be particularly at risk from PCBs. Mink (*Mustela vison*), for example, are extremely sensitive to PCBs, and diets with PCB concentrations of 0.67 : g/g could lead to reproductive failure (Ringer 1983).

The geometric mean PCB concentration reported for the NCBP (Schmitt *et al*. 1990) is 0.39 : g/g. None of the fillet, reconstructed wholebody, wholebody, or composite mussels samples in the Eastern Surplus study had GPCB concentrations that exceed the NCBP geometric mean. The fish with the highest GPCB level was a reconstructed wholebody smallmouth bass from the Dennys River deadwater reach (DW02SM) with a concentration of 0.26 : g/g. Overall, the mean GPCB concentration in whole fish is highest in the Dennys River fish - Dennys smallmouth bass (0.13 : g/g) > Dennys white sucker (0.05 : g/g) > Meddybemps smallmouth bass (0.04 : g/g) > Dennys brook trout

0.03 (：g/g) > E. Machias smallmouth bass (0.02 ：g/g) > E. Machias white sucker (0.01 ：g/g) > Meddybemps pumpkinseed (0.009 ：g/g). In the Maine component of the Regional Environmental Monitoring and Assessment Program (REMAP, DiFranco *et al*. 1995), PCB concentrations (expressed as Aroclor 1254 and 1260) ranged from 0.009 to 0.186 ：g/g in whole fish. The mean GPCB concentrations in reconstructed wholebody bass and trout or wholebody pumpkinseed and white sucker in the Eastern Surplus study are not higher than the REMAP Aroclor levels.

The GPCB concentrations in Meddybemps Lake, Dennys River, or the Dennys River reconstructed wholebody or wholebody fish do not exceed the wholebody protection criterion of 0.40 ：g/g proposed by Eisler and Belisle (1996). The GPCB levels in Dennys River reconstructed wholebody smallmouth bass, however, exceed the dietary protection criterion for piscivorous wildlife of 0.10 ：g/g listed in the Great Lakes Water Quality Agreement of 1978 (IJC 1989), and the fish flesh criterion of 0.11 ：g/g developed by New York State for the protection of piscivorous wildlife in the Niagra River (Newell *et al*. 1987). Consequently, some wildlife foraging on Dennys River bass adjacent to or below the Eastern Surplus Site may be adversely affected by PCB contamination.

The FDA promulgated a Tolerance Level for PCBs of 2 ：g/g for edible portions of fish sold commercially (FDA 1992). The State of Maine (Maine Department of Human Services 1997) advises no consumption of fish if PCB concentrations are greater than 0.044 ：g/g (cancer endpoint) or 0.160 ：g/g (non-cancer endpoint). Limited consumption is advised if PCB levels are between 0.011 - 0.044 ：g/g (cancer endpoint) or 0.040 - 0.160 ：g/g (non-cancer endpoint). The mean bass fillet PCB concentrations are 0.011 ：g/g for Meddybemps Lake, 0.026 ：g/g for the Dennys River, and 0.006 ：g/g for the East Machias River.

6.5.2 PCB Homologs - PCB compounds with the same number of chlorines or degrees of chlorination of the biphenyl group result in ten homologs (mono-, di-, tri-, tetra-, penta-, hexa-, hepta-, octa-, nona-, and deca-chlorobiphenyl; Eisler and Belisle 1996). Homolog profiles may be used to reveal the origin of PCB contamination (Valoppi *et al*. 1998) or differences in homolog distributions among sites (Secord and McCarty 1997).

In Meddybemps Lake, hexa-chlorobiphenyl and hepta-chlorobiphenyl were the dominant homologs in bass and pumpkinseed samples. There is no distinct pattern in homolog distribution in smallmouth bass among the three lake collection sites. However in pumpkinseed from the Eastern Surplus lake collection site, a different homolog pattern is evident. Tetra-chlorobiphenyl and penta-chlorobiphenyl homologs comprise 24% of the GPCB concentration in pumpkinseed from that location. These two homologs were rarely found in pumpkinseed collected from Fowler Point or Staples Cove.

Homolog distributions in Dennys River and East Machias River fish samples exhibit a more distinct pattern than fish collected from Meddybemps Lake locations. The penta-chlorobiphenyl homolog comprised a much greater proportion of the GPCB concentration in bass from the East Machias River than bass or brook trout from the Dennys River. Similarly, white sucker from the East Machias River

had a GPCB concentration comprised mostly (44%) of congeners within the tetra-chlorobiphenyl homolog. White suckers from the Dennys River have a similar homolog distribution as fish from Meddybemps Lake with hexa-chlorobiphenyl and hepta-chlorobiphenyl homologs dominating the GPCB concentration.

6.5.3 PCB Congeners - Toxic equivalency quotients (TEQs) for dioxin-like PCB congeners were not calculated for this report. Our discussion was limited to an assessment of the dominant PCB congeners and the occurrence of co-planar non-*ortho* congeners. In general, the GPCB levels were low in all tissue samples and the utility of TEQs in this instance may be limited. Risk assessors of EPA or the Maine Department of Environmental Protection, however, may apply TEFs in the derivation of human health and ecological health TEQs for the Eastern Surplus Site and find degrees of risk associated with the consumption of fish and mussels by humans or ecological receptors. Therefore, as noted earlier, our interpretations of congener concentrations should not be considered a risk assessment under the provision of CERCLA.

The dominant PCB congener patterns in Meddybemps Lake, Dennys River, and East Machias River fish were not highly unusual. PCB #170, a di-*ortho* congener, was the dominant congener detected in bass fillet samples from Meddybemps Lake. This congener is commonly found in significant amounts in environmental samples and it is known to be an active inducer of ethoxyresorufin ?-deethylase activity (EROD, Ahlborg *et al*. 1994). PCB #153, another di-*ortho* congener, was also frequent, if not the predominant congener, in the fillet and carcass tissue of Meddybemps Lake, Dennys River, and E. Machias River fish. PCB #153 is common in environmental samples, often occurring in parts-per-billion concentrations in biota (Metcalf and Haffner 1995). It is less cytotoxic than PCB#169, but can be an effective inhibitor of intercellular communication (Eisler and Belisle 1996). In one study, PCB #153 concentrations up to 6.2 : g/g did not produce dioxin-like toxicity in early life stages of rainbow trout (Walker and Peterson 1991). However, Walker and Peterson (1991) cited another study where PCB #153 tissue concentrations of 3.7 : g/g and 8.7 : g/g caused 100% mortality in sac-fry of chinook salmon (*Oncorhynchus tschawytscha*) and lake trout (*Salvelinus namaycush*). In the Eastern Surplus study, even at its highest concentration (0.06 : g/g in a bass carcass from the Dennys River deadwater), PCB #153 was well below the effect ranges cited by Walker and Peterson (1991).

Non-*ortho* congeners (i.e., PCB #77, #126, #169) are considered the most toxic congeners to biota with toxic characteristics similar to polychlorinated dioxins and dibenzofurans (Metcalf and Haffner 1995). Bass in the deadwater reach of the Dennys River had the highest concentrations of non-*ortho* PCB congeners. The mean total non-*ortho* congener concentration (#77 + #126 + #169) in reconstructed wholebody bass from the deadwater reach is 121.0 pg/g (range: 38 - 251 pg/g). Among these three congeners, PCB #126 was detected at its highest concentrations, 174 pg/g, in two reconstructed wholebody bass from the deadwater reach. PCB #126 is probably the most toxic PCB congener. In laboratory exposure studies (Walker and Peterson 1991), PCB #126 was 19 times more lethal than PCB #77 to early life stages of rainbow trout. Non-*ortho* PCB congener concentrations in upper trophic level fish from the Dennys River may pose a risk to piscivorous ecological receptors.

7.0 Summary

7.0.1 Meddybemps Lake Results

Trace Elements

Compared to national, regional, and other Maine contaminant studies, highly elevated levels of trace elements were not detected in tissues of two species of Meddybemps Lake fish (smallmouth bass, pumpkinseed) and mussel (eastern elliptio, alewife floater).

Comparisons of trace element concentrations in fish tissue among the three Meddybemps Lake sampling locations do not suggest major site-related impacts to fish or mussels from the Eastern Surplus Superfund Site. Some site-specific statistically significant ($p < 0.05$) differences in fish tissue were found for concentrations of copper, zinc, and mercury.

- Copper in smallmouth bass fillets and reconstructed wholebody bass, and zinc in reconstructed wholebody bass were significantly higher at the Eastern Surplus Site than in bass from Staples Cove or Fowler Point.

- Mercury in bass fillets was significantly higher in Staples Cove, the lake reference area, than in bass collected near the Eastern Surplus Site or at Fowler Point.

Freshwater mussel composite samples from Meddybemps Lake tended to have higher trace element concentrations than fish. The mussel composite sample collected along the Eastern Surplus shoreline did not have markedly different trace element concentrations than the samples collected at Fowler Point or Staples Cove.

Polychlorinated Biphenyls (PCBs) and Organochlorine Pesticides (OCs)

Compared to national, regional, and other Maine contaminant studies, highly elevated levels of PCBs and OC pesticides were not detected in Meddybemps Lake fish or mussel tissue.

- Smallmouth bass fillet samples and reconstructed wholebody bass collected near the Eastern Surplus Superfund Site had significantly higher ($p < 0.05$) PCB concentrations than bass taken from Fowler Point and Staples Cove. Although significantly different, the levels were not highly elevated. The highest smallmouth bass reconstructed wholebody PCB concentration was only 0.13 ∶g/g, while the highest bass fillet had only 0.03 ∶g/g.

- Organochlorine pesticides, in general, were rarely detected in Meddybemps Lake smallmouth bass tissue samples. The most commonly detected OC pesticide was p,p'- DDE. OC

pesticides were not detected in Meddybemps Lake wholebody pumpkinseed or in freshwater mussel composite samples.

< Low levels of endosulfan were detected in smallmouth bass collected near the Eastern Surplus Site. This contaminant was not detected in bass collected from Staples Cove or Fowler Point or in wholebody pumpkinseed from any of the three Meddybemps Lake collection locations.

7.0.2 Dennys River and East Machias River Results

Trace Elements

Compared to national, regional, and other Maine contaminant studies, highly elevated levels of trace elements were not detected in tissues of three species of fish (smallmouth bass, brook trout, white sucker) and one species of freshwater mussel (alewife floater). Trace element levels were also not highly elevated in fish (smallmouth bass, white sucker) or mussels (eastern elliptio) collected from the East Machias River, the reference river for this study.

Comparisons of trace element concentrations in tissue samples from three Dennys River and two East Machias River fish collection locations do not suggest major site-related impacts to fish or mussels from the Eastern Surplus Superfund Site. Composite mussel sample concentrations also do not suggest site-related impacts. Some site-specific statistically significant ($p < 0.05$) differences in riverine fish tissue were found for selenium and cadmium.

< Selenium was significantly higher in reconstructed wholebody bass from the East Machias River than bass from the Dennys River.

< Wholebody white sucker from the East Machias River reference area had significantly higher levels of cadmium than suckers taken from the Dennys River.

< Compared to the other sampling locations, chromium appears to be higher in the fillets of Dennys River smallmouth bass collected adjacent to the Eastern Surplus Site. However, the sample data at that particular location are highly variable.

Polychlorinated Biphenyls (PCBs) and Organochlorine Pesticides (OCs)

Compared to national, regional, and other Maine contaminant studies, highly elevated levels of PCBs and OC pesticides were also not detected in fish or mussels from the Dennys River and East Machias River.

< Reconstructed wholebody smallmouth bass from the deadwater reach of the Dennys River had significantly higher ($p < 0.05$) concentrations of PCBs than bass from the East Machias River.

- The highest reconstructed wholebody PCB concentration in the study, 0.26 ：g/g, was found in a 15.5 inch smallmouth bass from the Dennys River deadwater reach.

- PCB concentrations were significantly higher ($p < 0.05$) in wholebody white sucker from the Dennys River than suckers from the East Machias River. Although statistically higher than the East Machias River, the mean PCB concentration in wholebody white sucker from the Dennys River is only 0.05 ：g/g.

- Low levels of endosulfan were detected in Dennys River bass collected adjacent to the Eastern Surplus Site and in the downstream deadwater reach. This contaminant was not detected in white suckers from the Dennys River or in bass or suckers from the East Machias River.

- Brook trout from the Dead Stream/Dennys River confluence appeared to have higher concentrations of dieldrin and DDT metabolites than smallmouth bass collected from the Dennys River adjacent to the Eastern Surplus Site, in the Dennys River deadwater reach, or from the East Machias River near Hadley Lake.

- OC pesticides were not detected in composite mussel tissue samples from the Dennys River or East Machias River.

7.0.3 Potential risk to Atlantic salmon from the Eastern Surplus Site

Smallmouth bass inhabit segments of the Dennys River where the highest levels of PCB contamination would be expected (i.e., deadwater reaches with depositional areas dominated by fine-grain sediments). Bass are resident fish; living for as long as 7 years in the river. They likely represent the "worst case" bioaccumulation scenario. Atlantic salmon in the Dennys River spend most of their early life stages in areas where less PCB contamination would be expected (i.e., riffles with a boulder, cobble, or gravel substrate. The residence time of juvenile Atlantic salmon in Maine rivers (egg to smolt) is up to three years (Stanley and Trial 1995). Since Atlantic salmon develop in portions of the Dennys River where less contamination would be expected, and also reside for shorter periods of time in the river than smallmouth bass, we would expect PCB levels in developing Atlantic salmon to be even lower than the levels found in bass. This assessment, however, only pertains to salmon inhabiting portions of the river near our collection locations.

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FIGURES

Figure 1. General site map - Eastern Surplus Superfund Site, Meddybemps, ME.

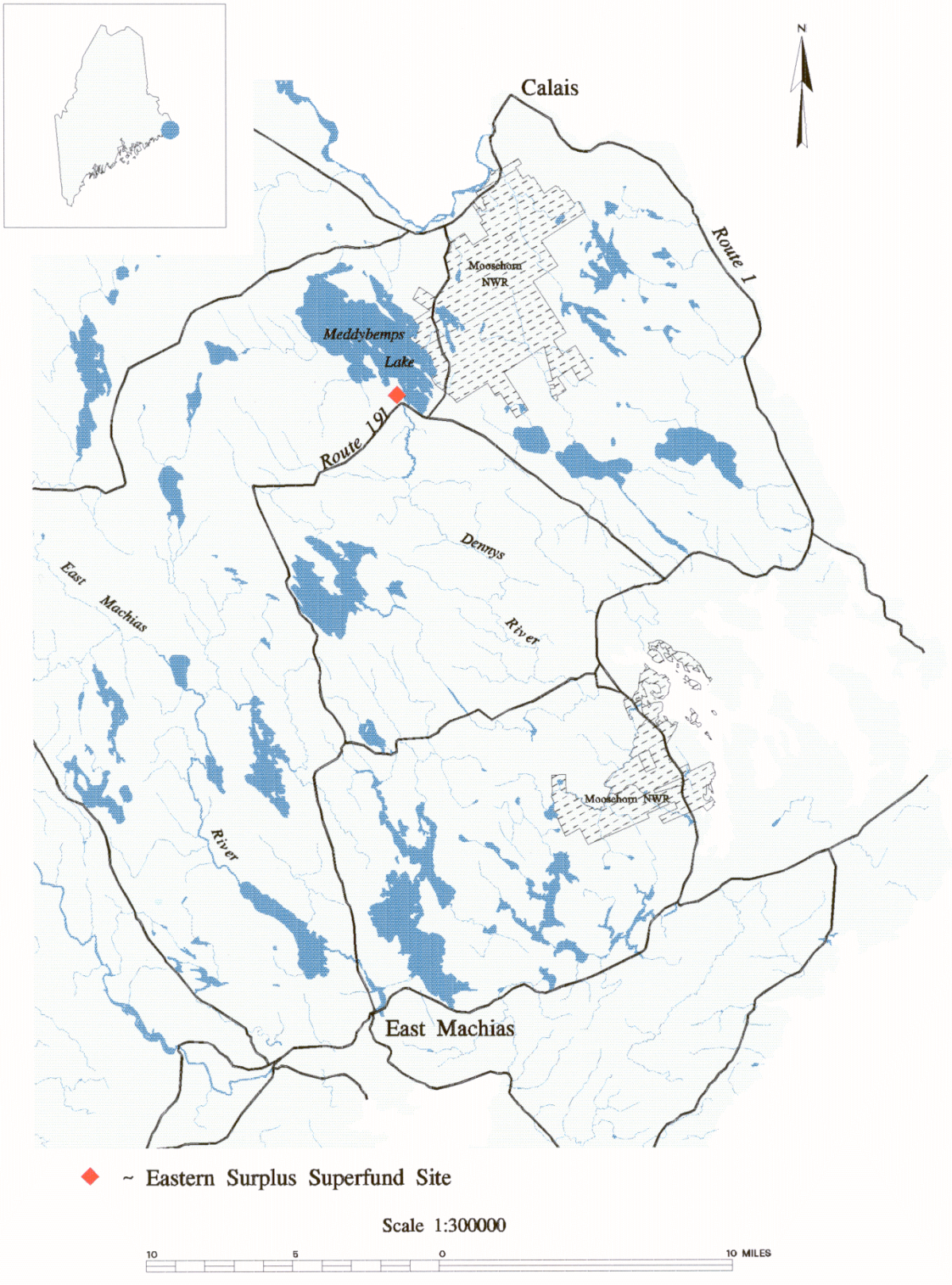


Figure 2. Collection locations in Meddybemps Lake.

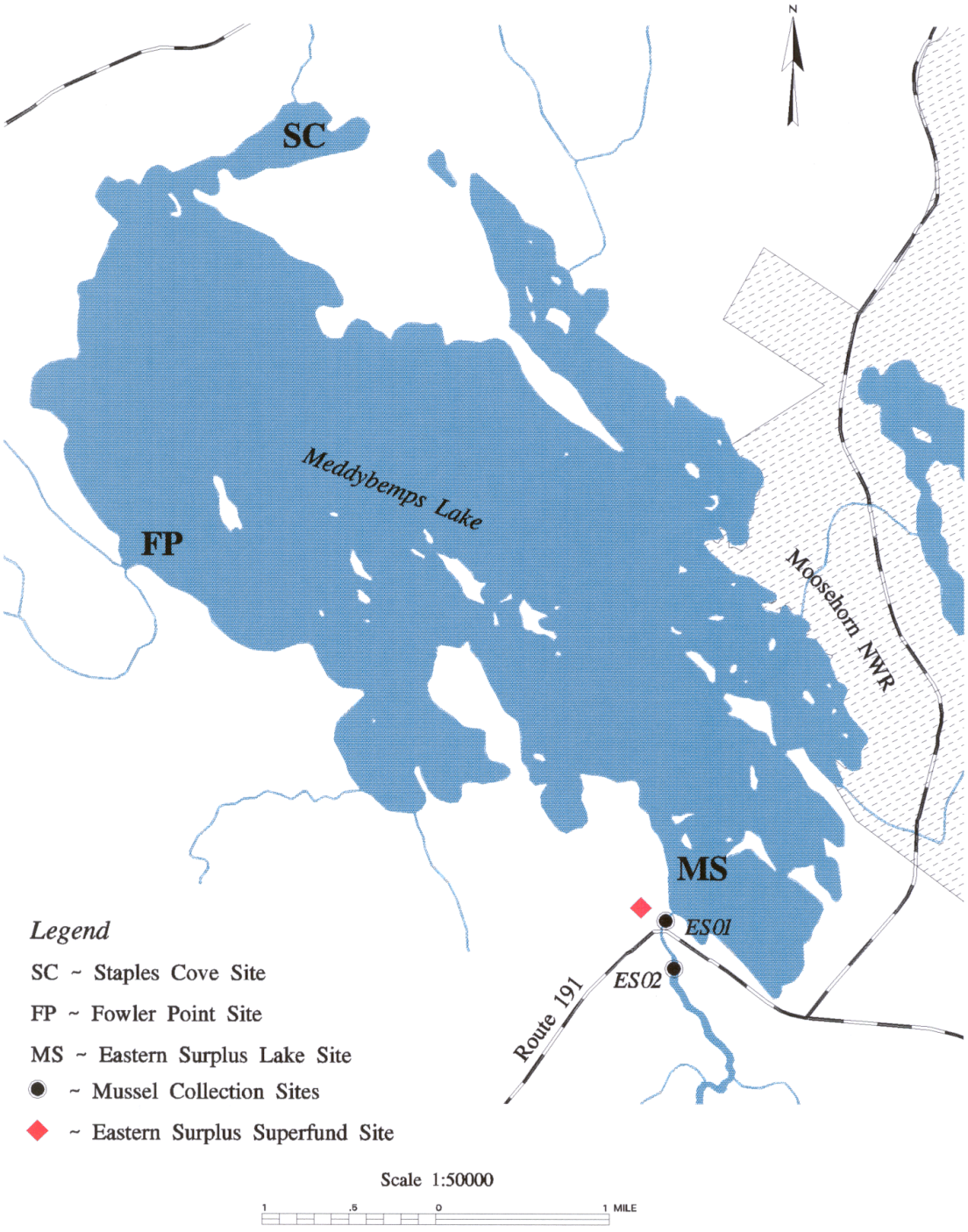


Figure 3. Collection locations in the Dennys River.

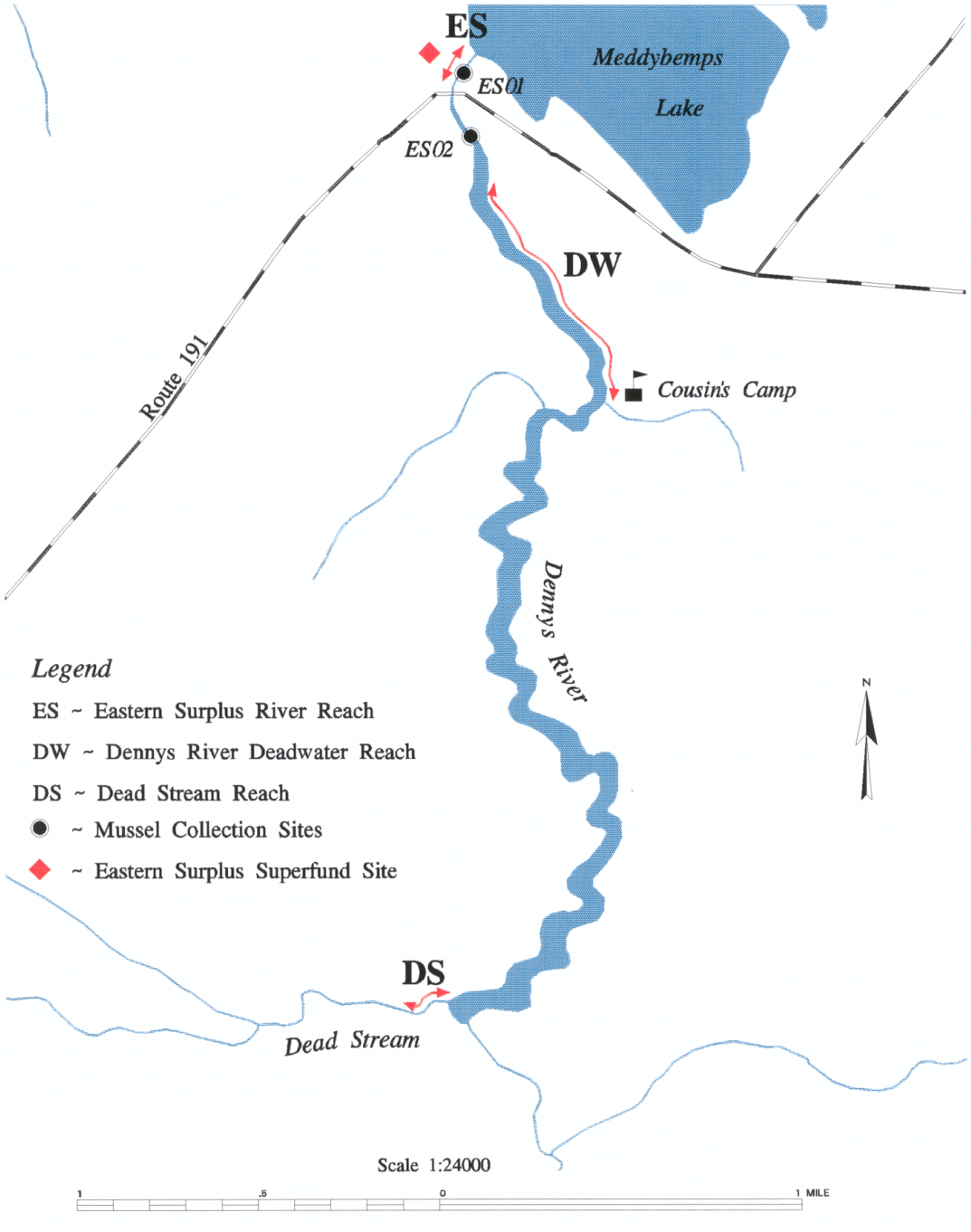


Figure 4. Collection locations in the East Machias River.

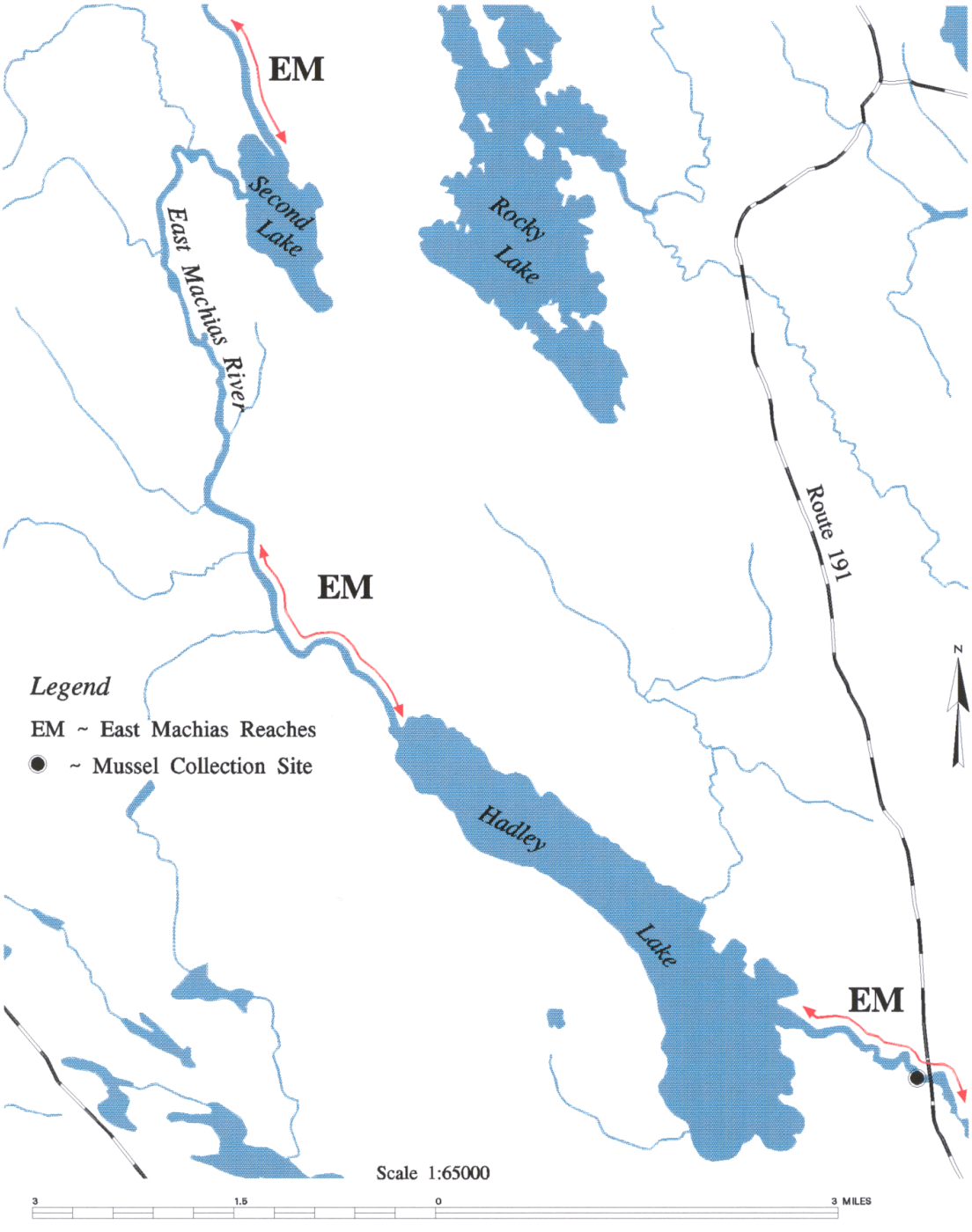


Figure 5. Mercury in Smallmouth Bass Fillets from Meddybemps Lake, the Dennys River, and East Machias River.

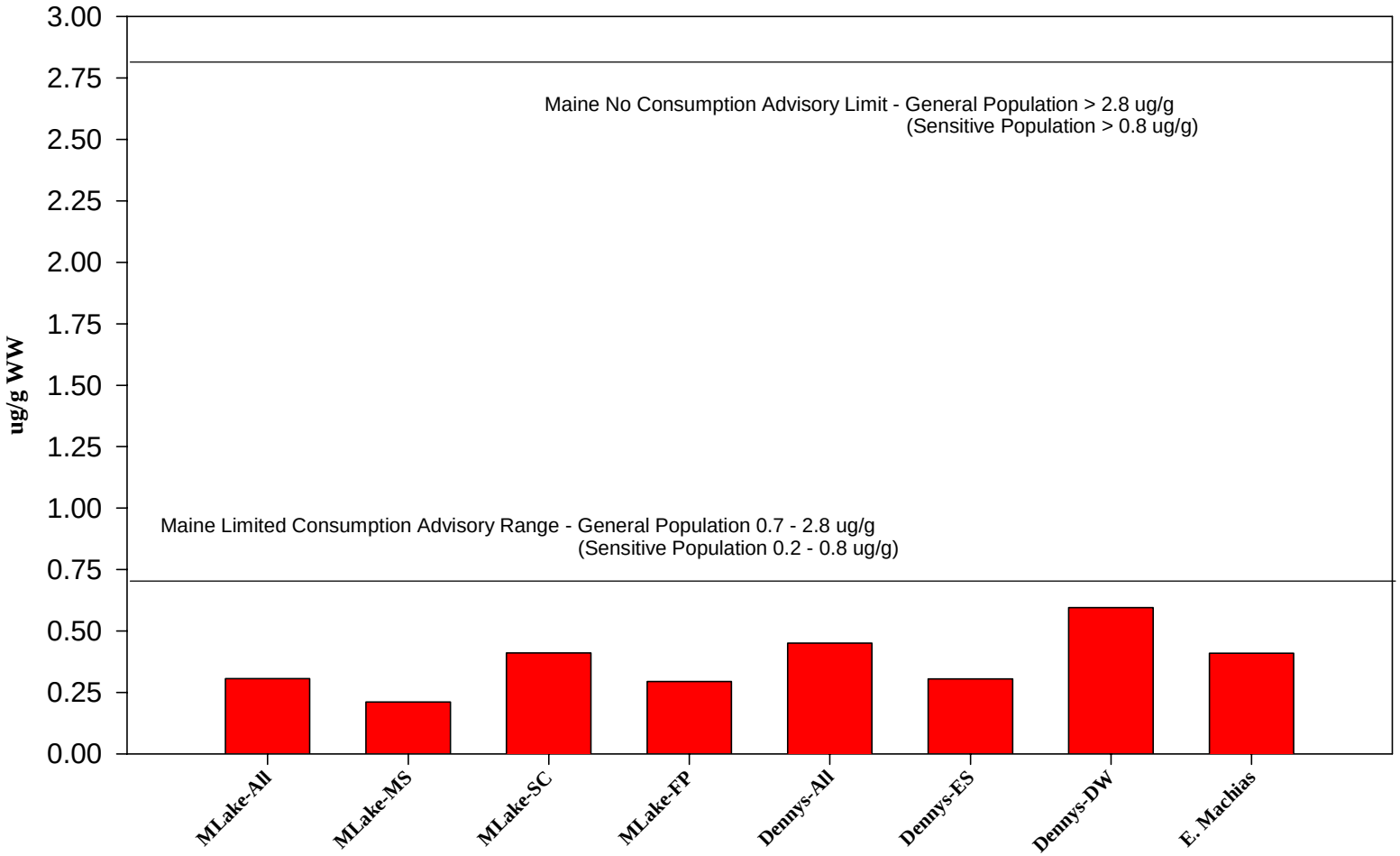


Figure 6. Total PCBs in Smallmouth Bass Fillets from Meddybemps Lake, the Dennys River, and East Machias River.

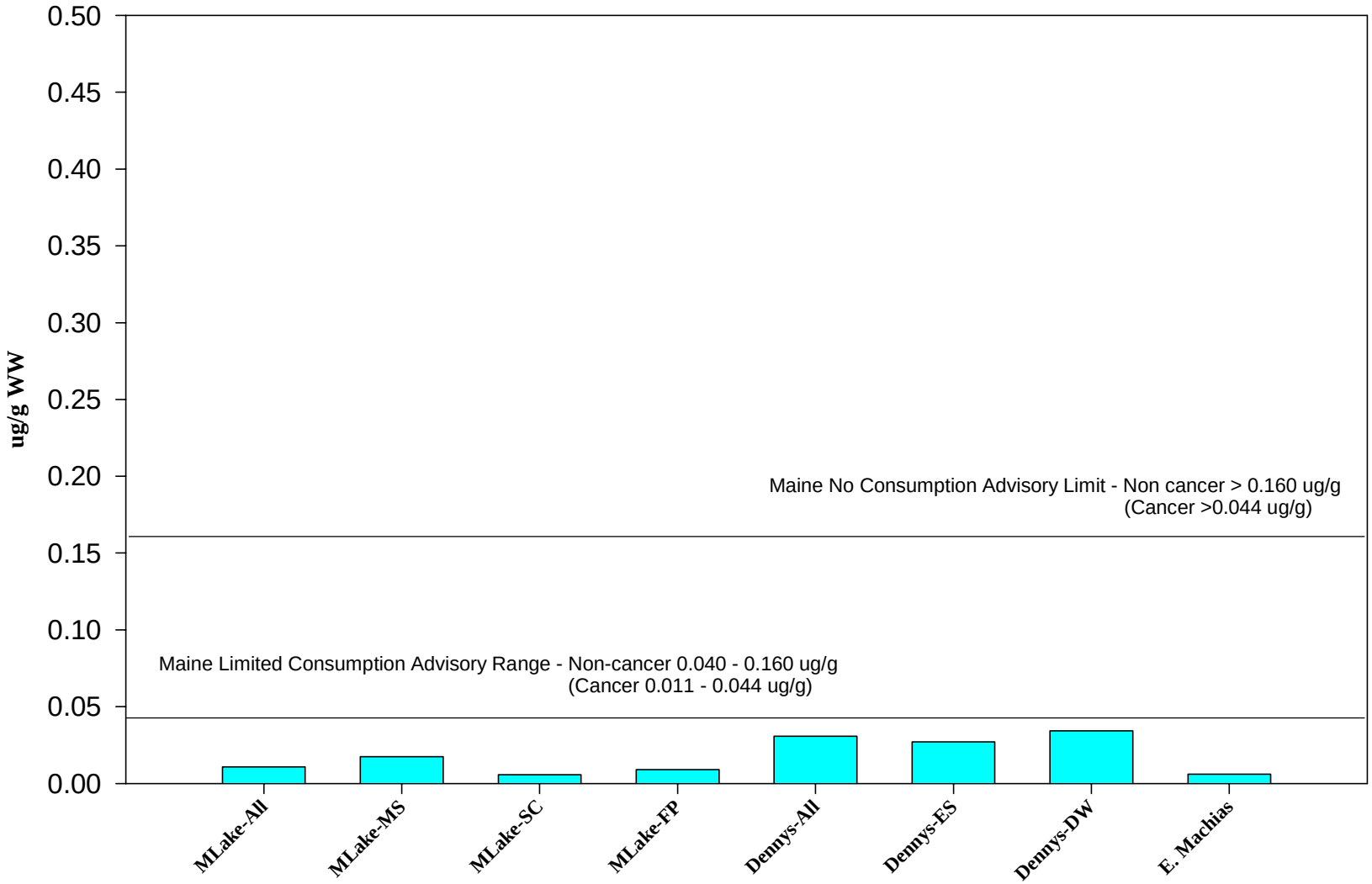


Figure 7. Total PCBs in Freshwater Mussel Composite Samples

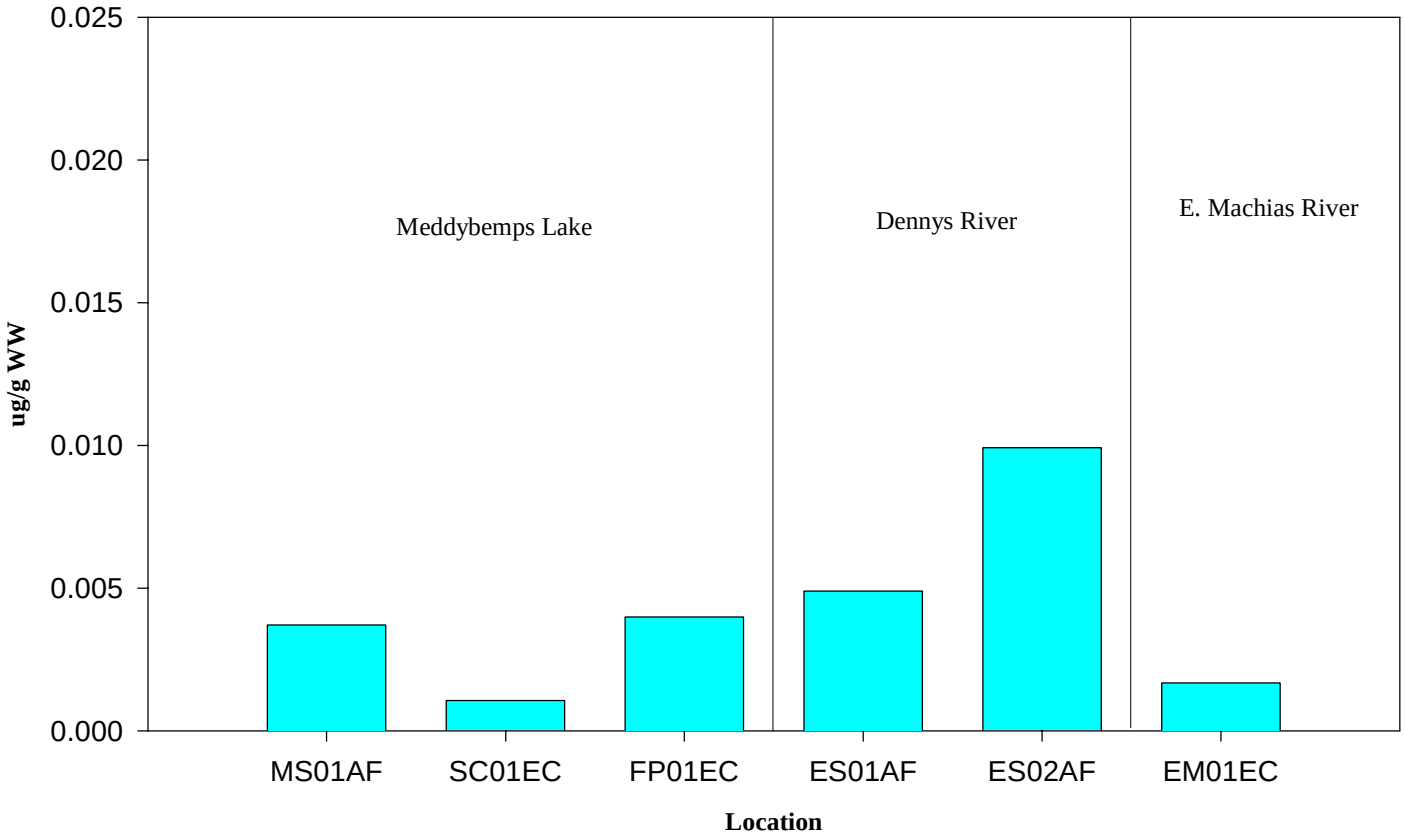
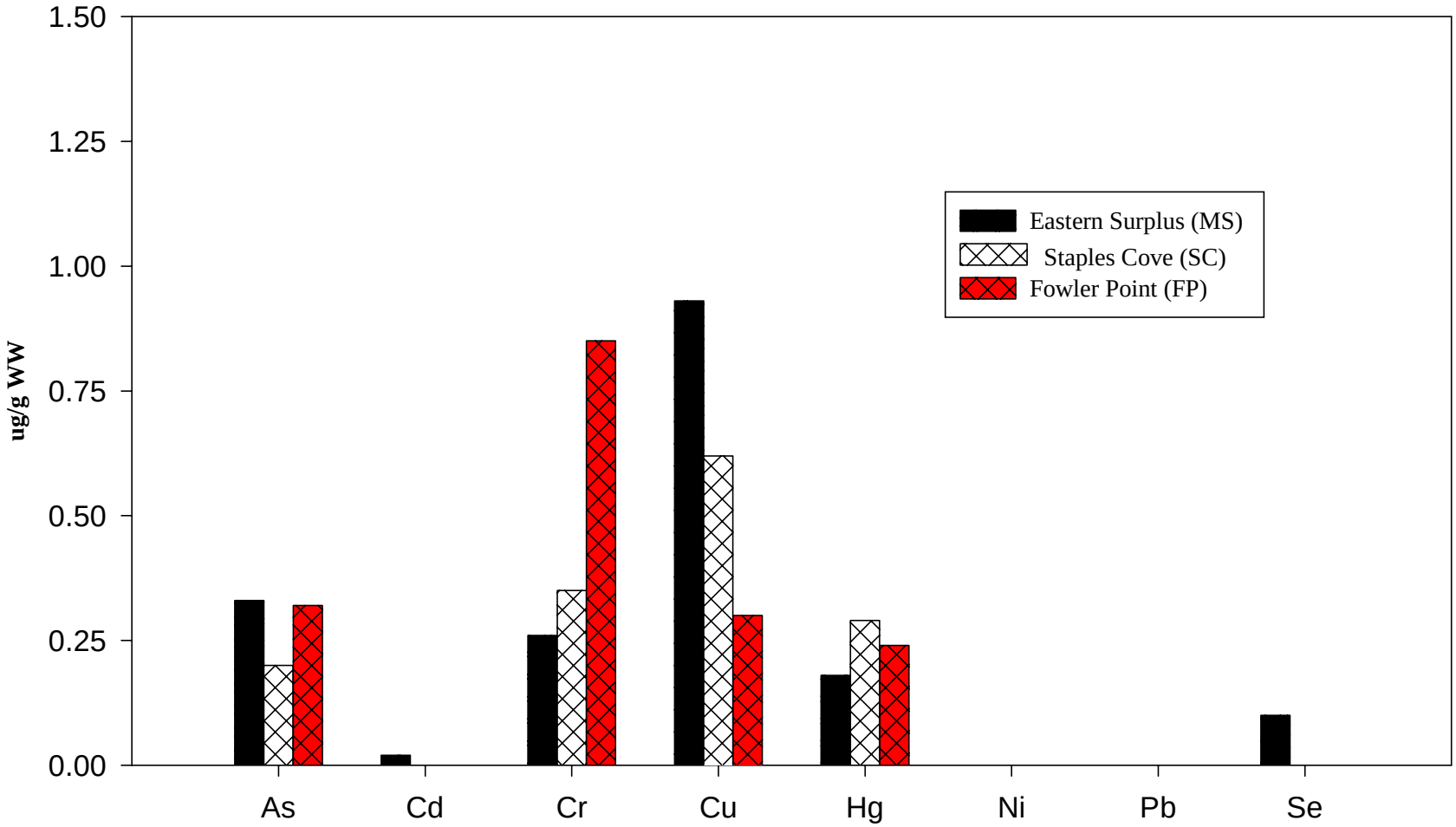
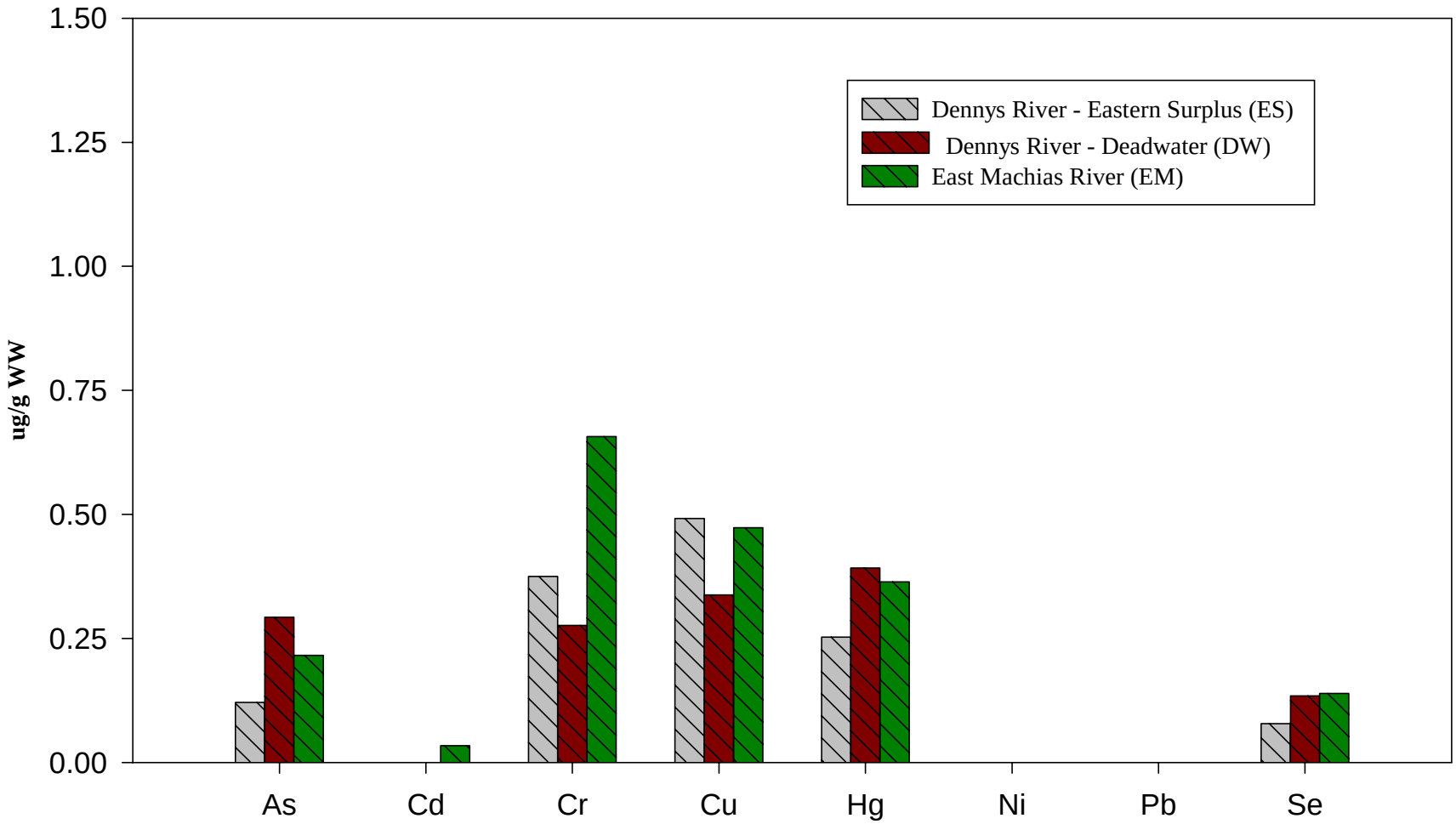


Figure 8. Trace Elements in Reconstructed Wholebody Smallmouth Bass, Meddybemps Lake



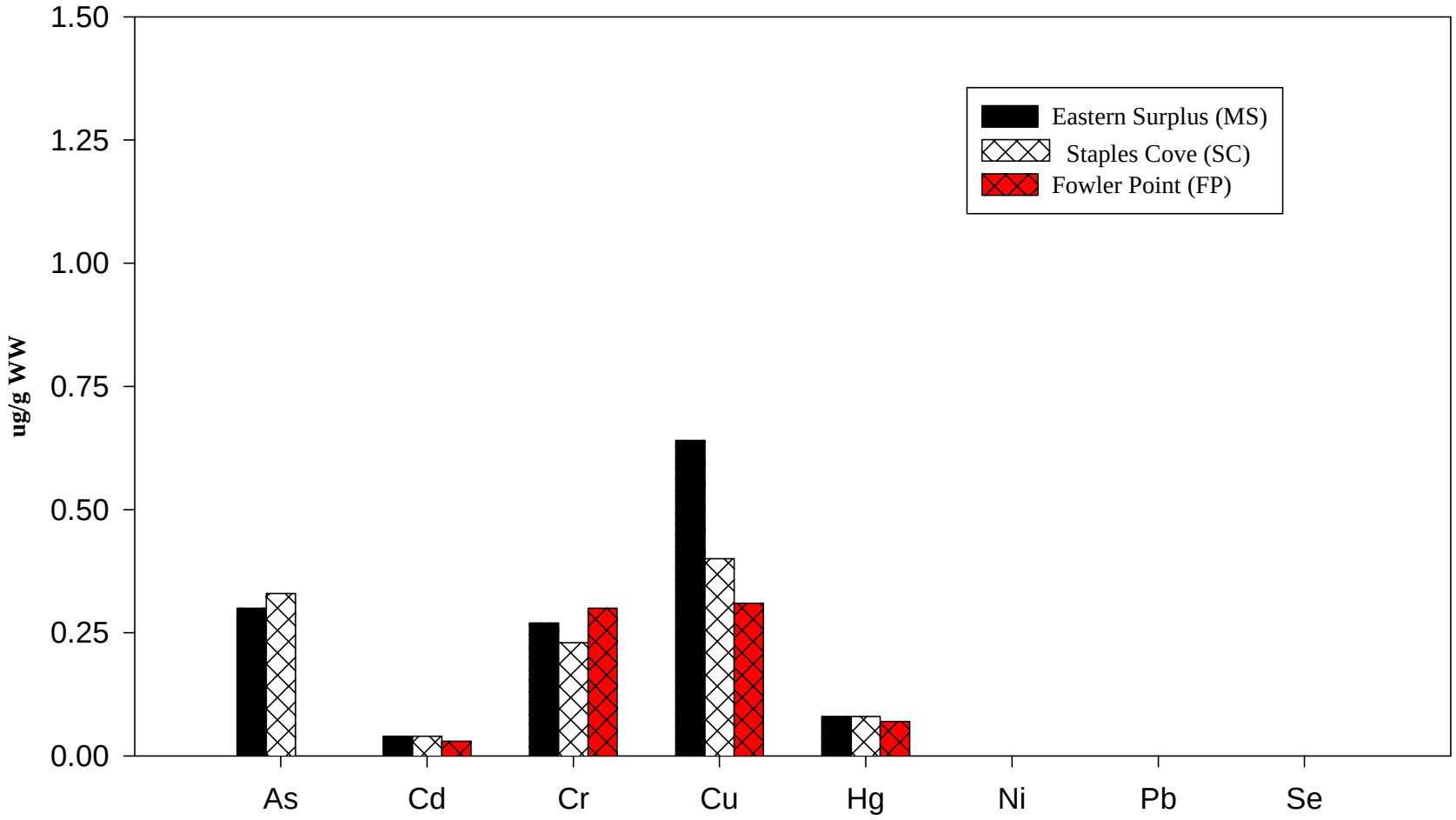
Missing bars indicate all non-detects or too few detections to calculate a mean (i.e, more than one-half the samples were non-detects)

Figure 9. Trace Elements in Reconstructed Wholebody Smallmouth Bass, Dennys River and East Machias River



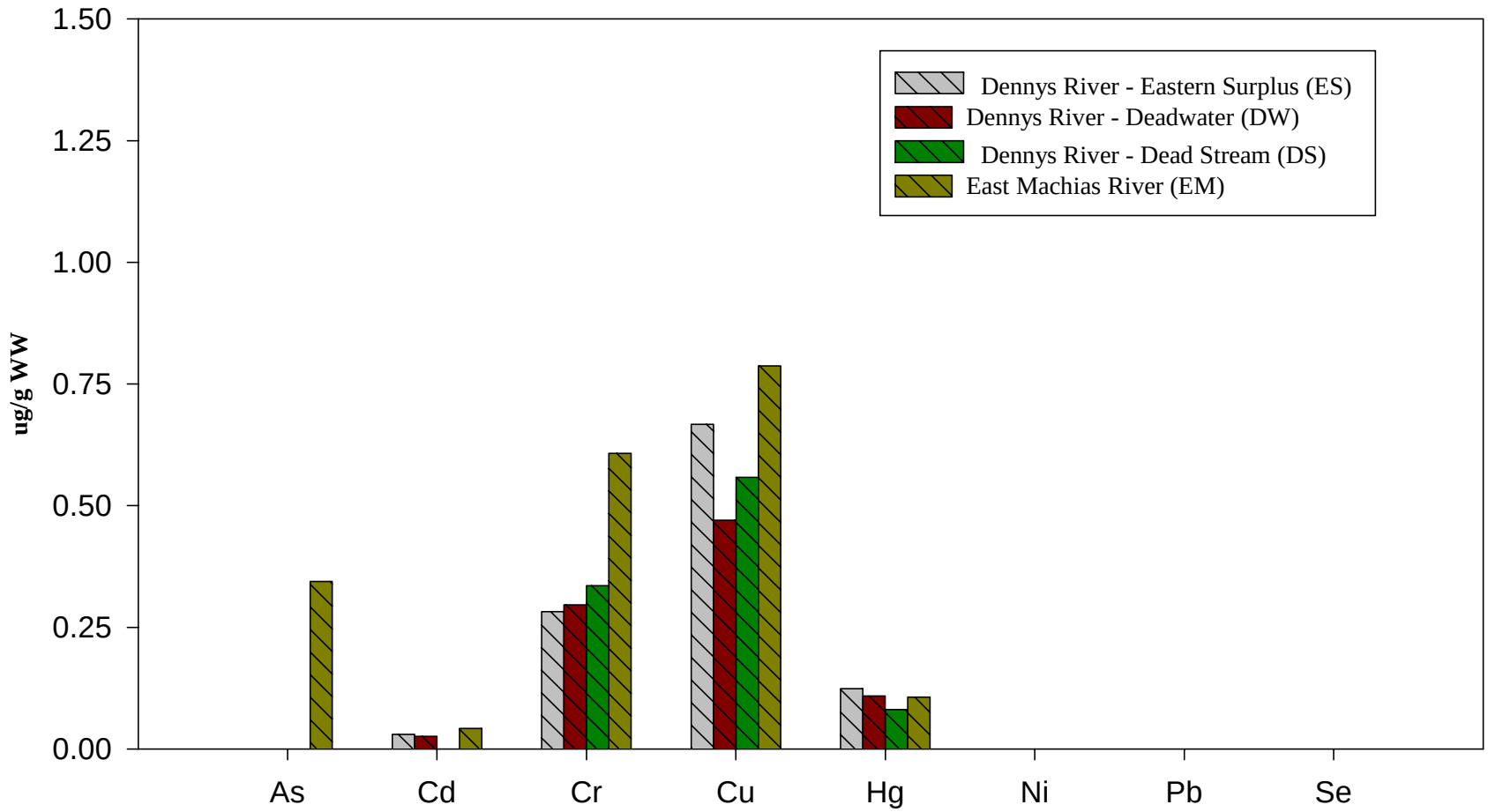
Missing bars indicate all non-detects or too few detections to calculate a mean (i.e, more than one-half the samples were non-detects)

Figure 10. Trace Elements in Wholebody Pumpkinseed, Meddybemps Lake



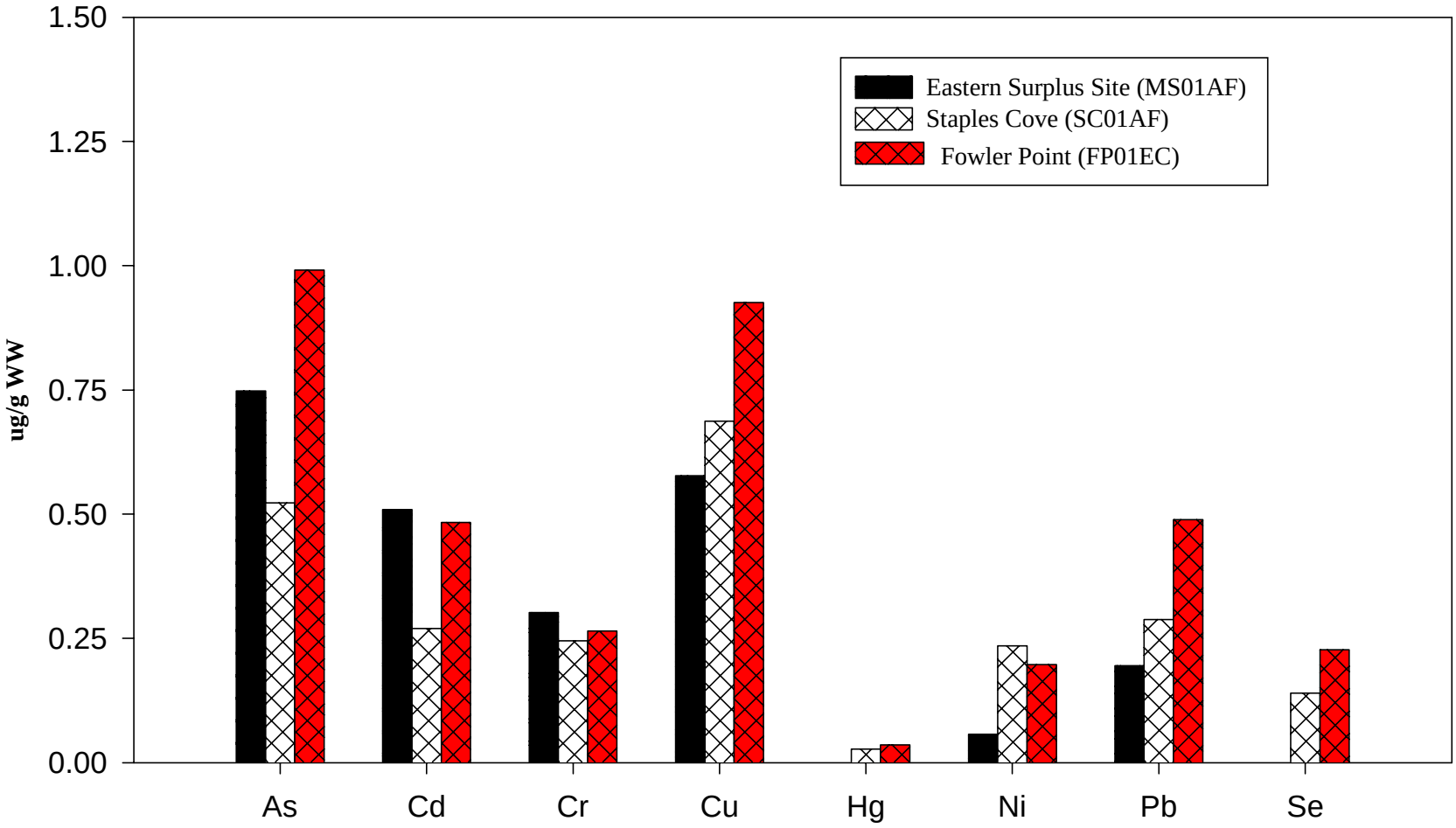
Missing bars indicate all non-detects or too few detections to calculate a mean (i.e., more than one-half the samples were non-detects).

Figure 11. Trace Elements in Wholebody White Sucker, Dennys River and East Machias River



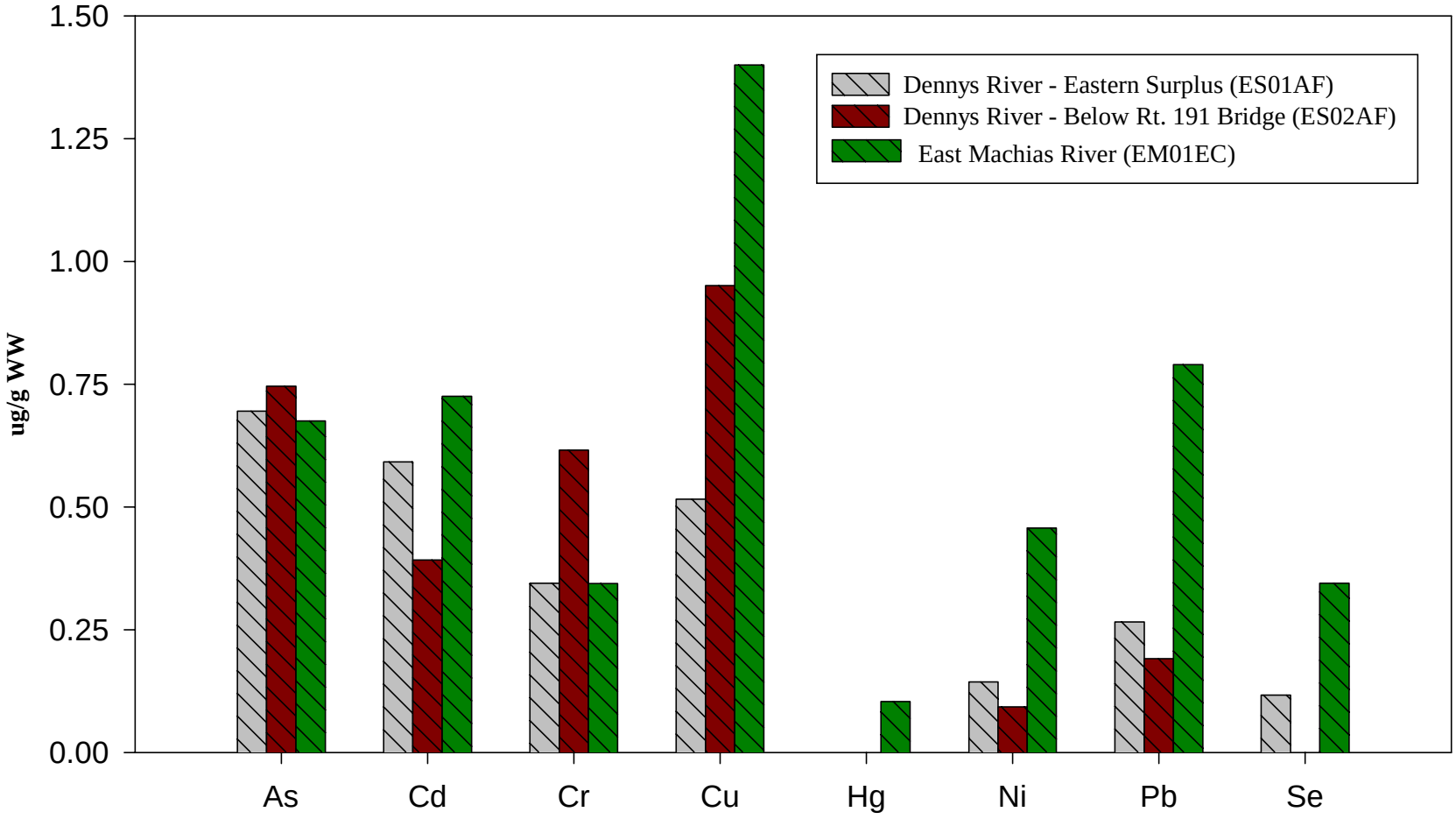
Missing bars indicate all non-detects or too few detections to calculate a mean (i.e., more than one-half the samples were non-detects).

Figure 12. Trace Elements in Freshwater Mussel Composite Samples, Meddybemps Lake



Missing bars indicate a non-detect.

Figure 13. Trace Elements in Freshwater Mussel Composite Samples, Dennys River and East Machias River



Missing bars indicate a non-detect.

Figure 14. Organochlorines in Reconstructed Wholebody Smallmouth Bass, Meddybemps Lake

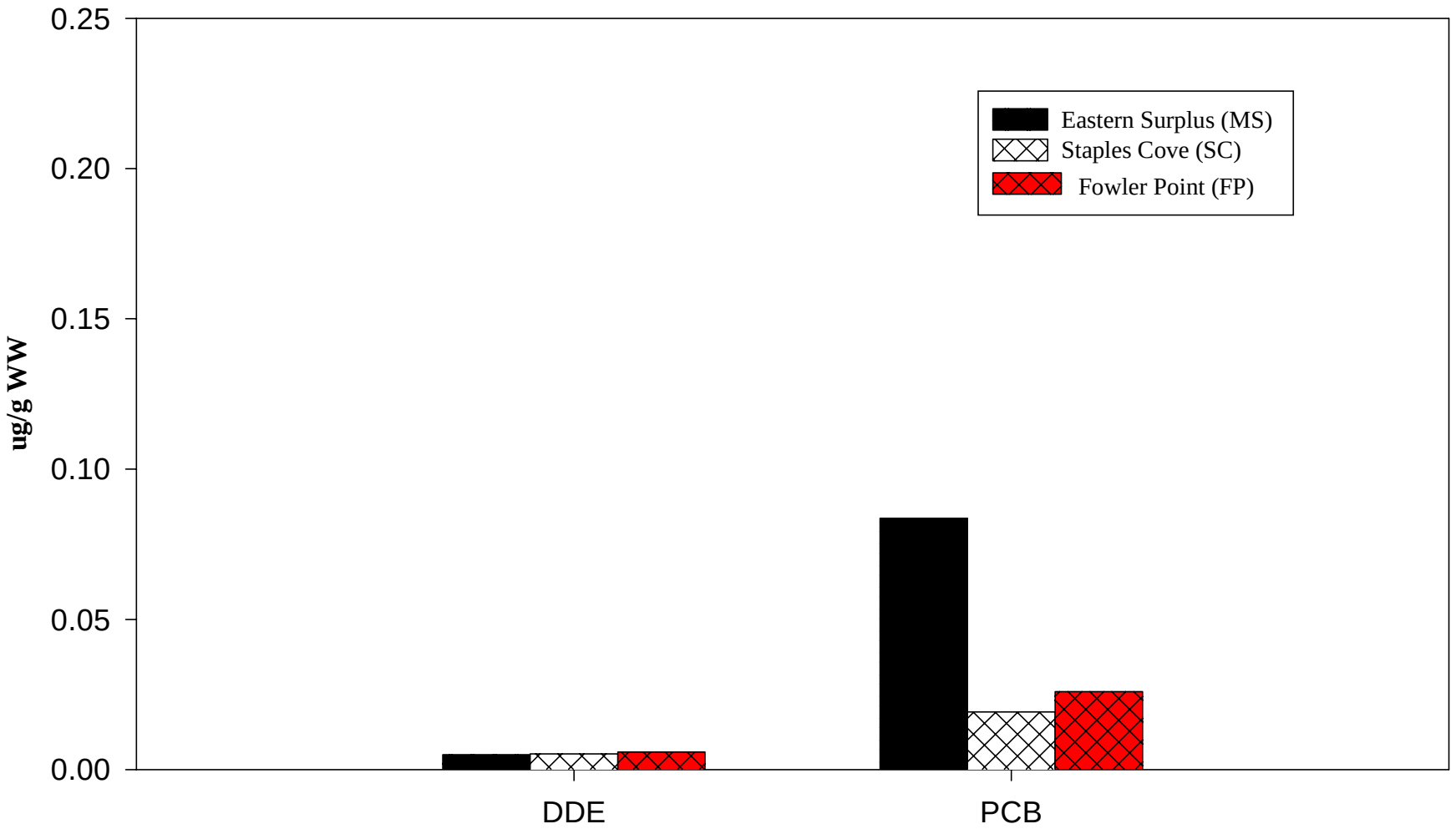


Figure 15. Organochlorines in Reconstructed Wholebody Smallmouth Bass, Dennys River and E. Machias River

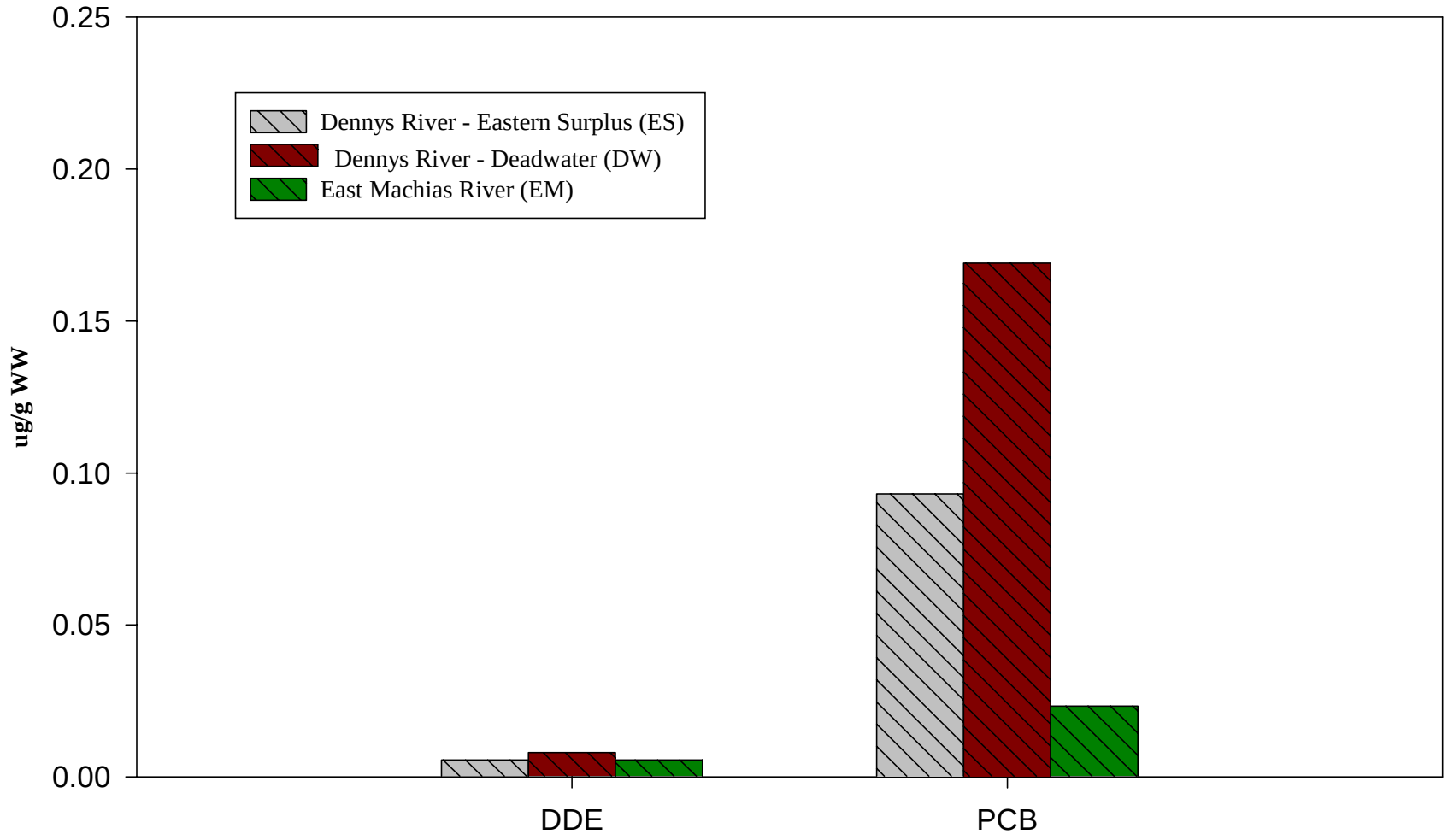
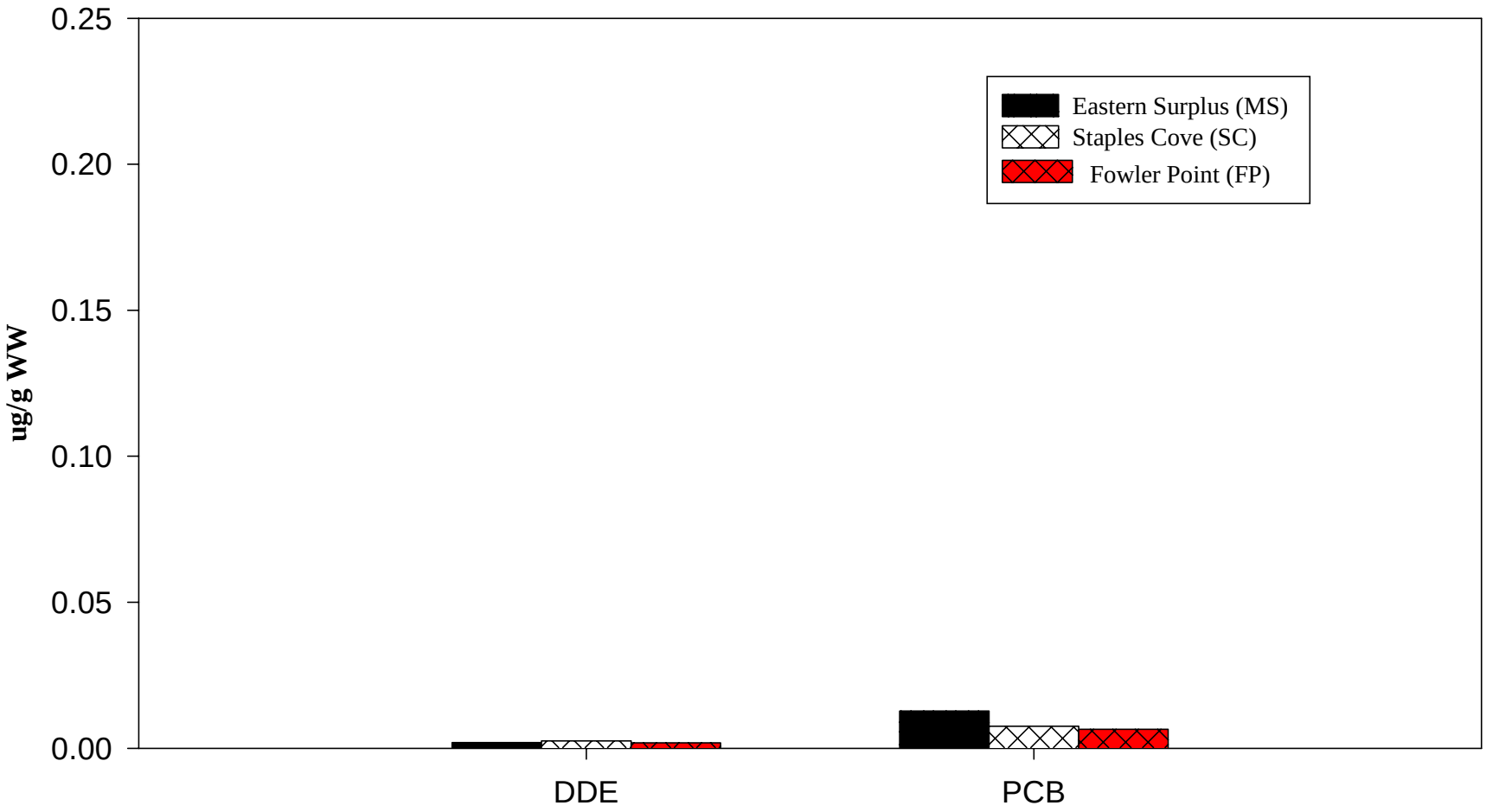
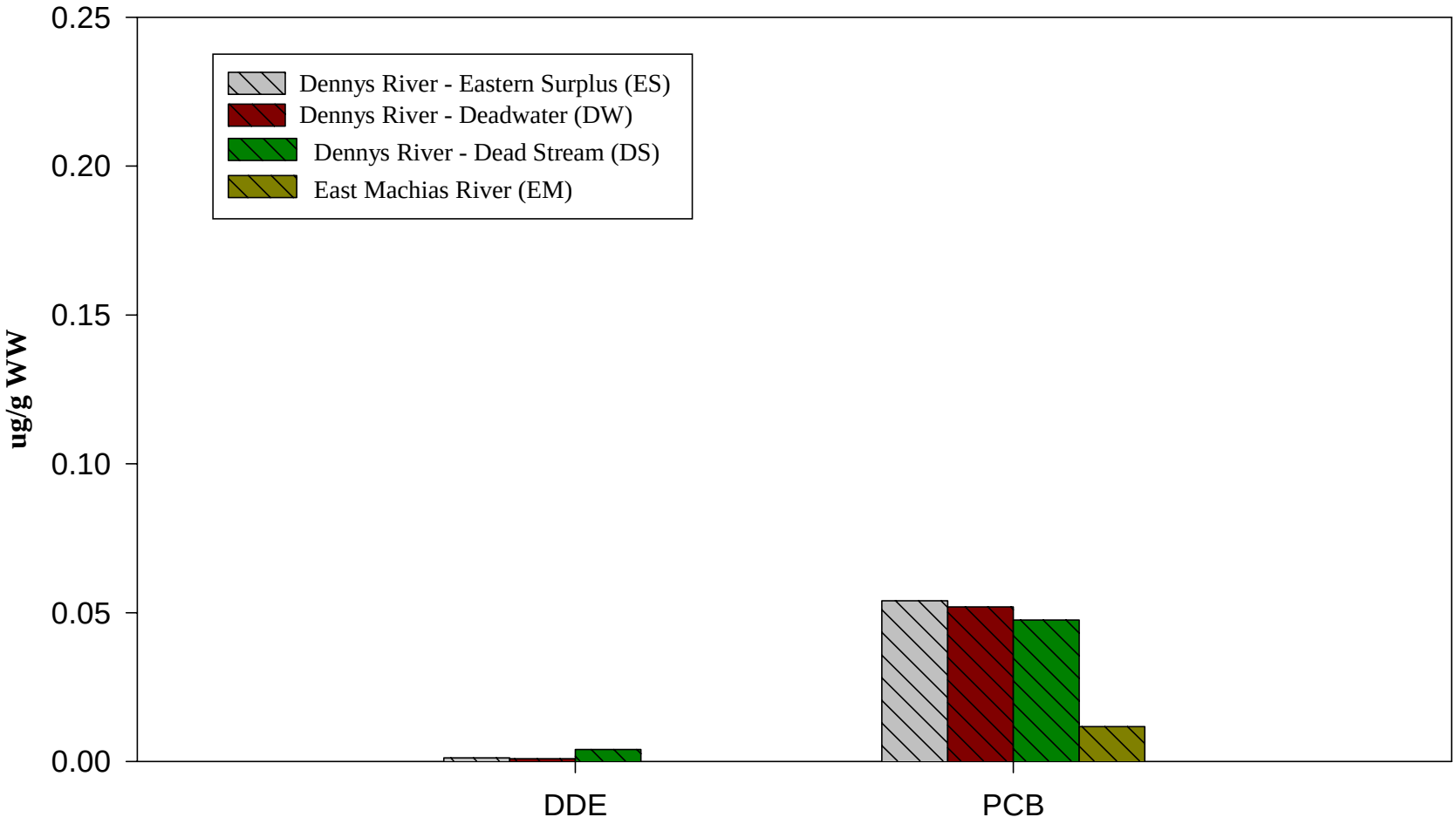


Figure 16. Organochlorines in Wholebody Pumpkinseed, Meddybemps Lake



Missing bars indicate all non-detects or too few detections to calculate a mean (i.e., more than one-half the samples were non-detects).

Figure 17. Organochlorines in Wholebody White Sucker, Dennys River and East Machias River



Missing bars indicate all non-detects or too few detections to calculate a mean (i.e., more than one-half the samples were non-detects).

Figure 18. PCB Homologs in Reconstructed Wholebody Smallmouth Bass, Meddybemps Lake

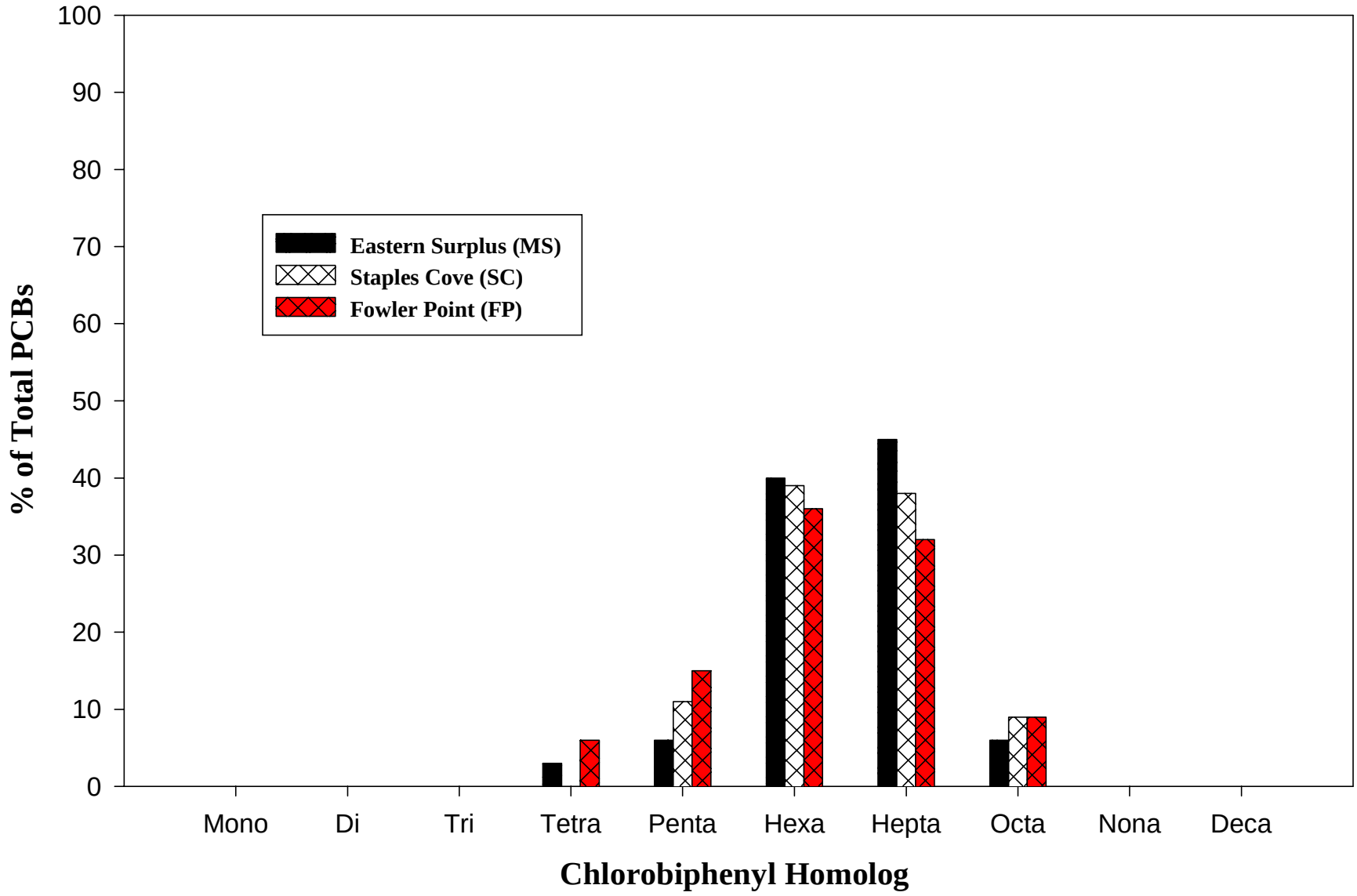


Figure 19. PCB Homologs in Reconstructed Wholebody Smallmouth Bass and Brook Trout
Dennys River and East Machias River

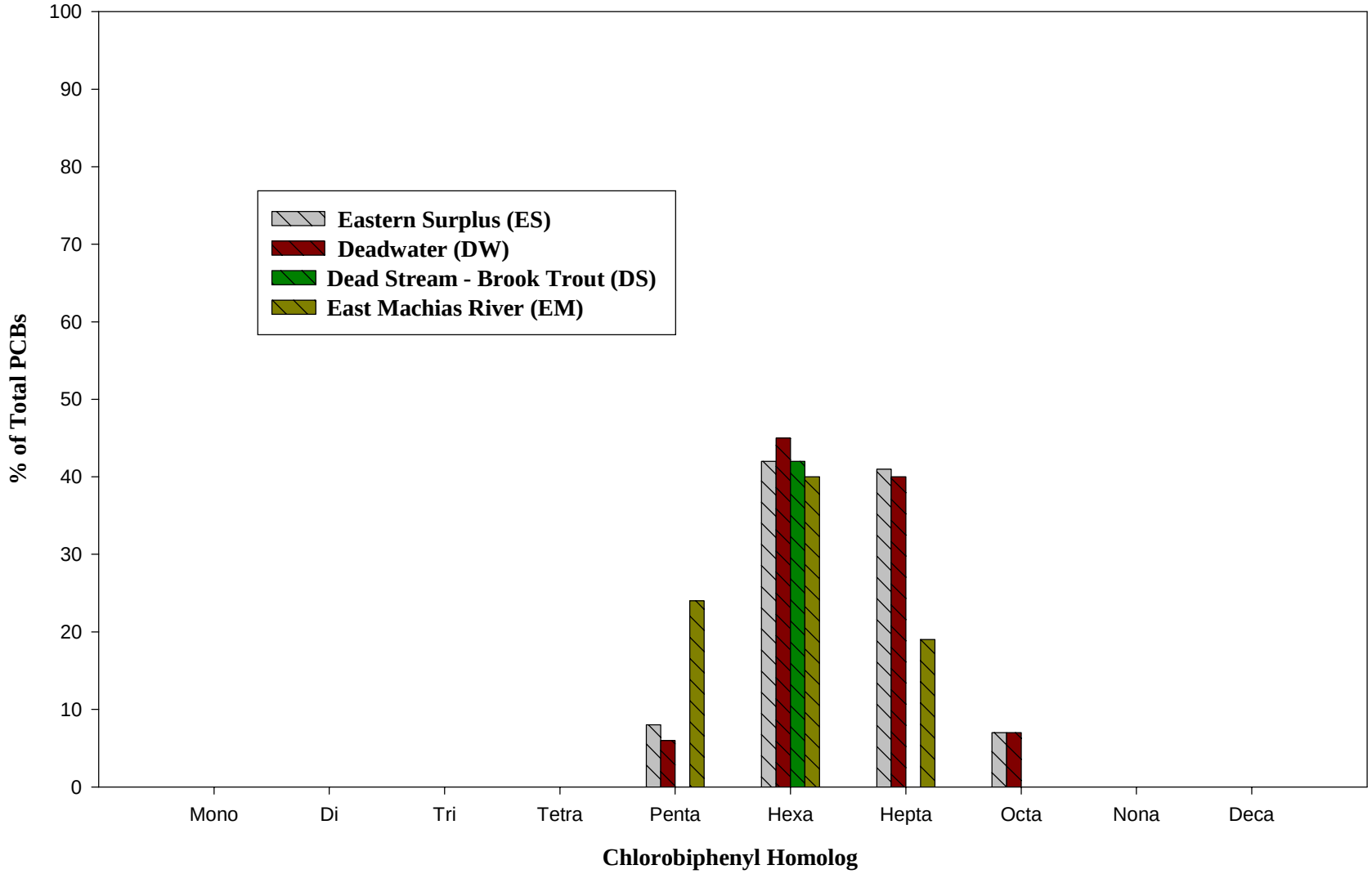


Figure 20. PCB Homologs in Wholebody Pumpkinseed, Meddybemps Lake

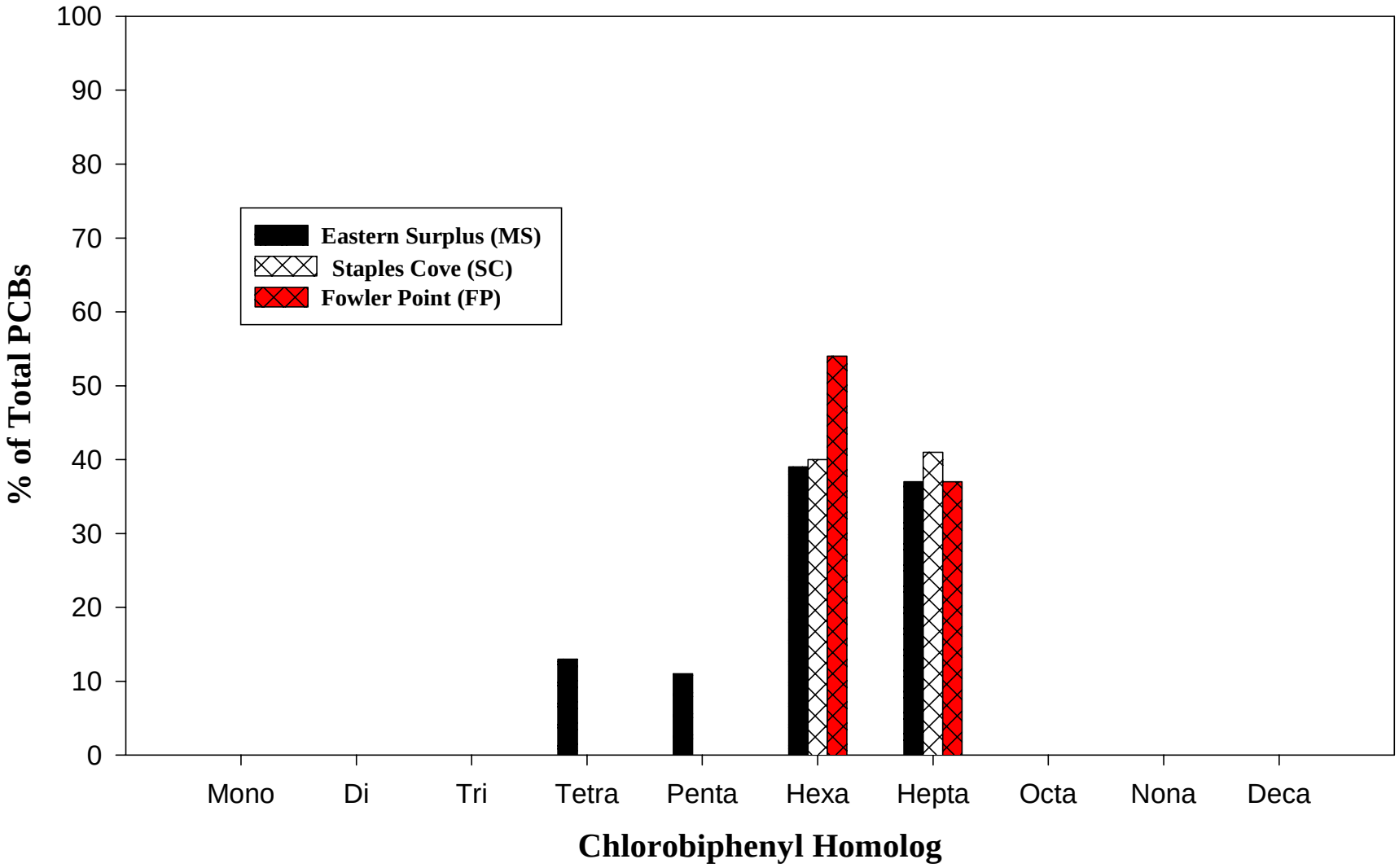


Figure 21. PCB Homologs in Wholebody White Sucker, Dennys River and East Machias River

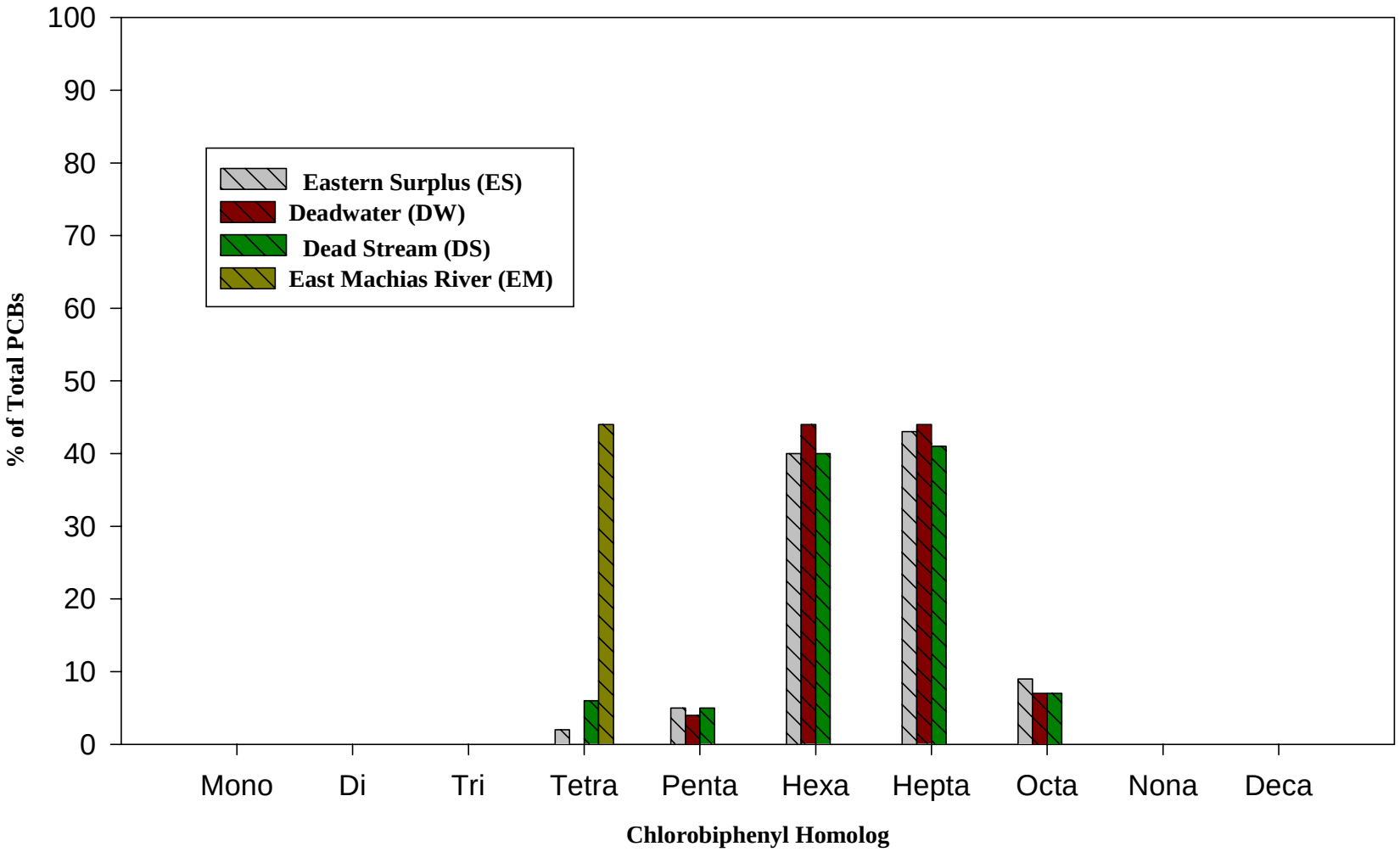


Figure 22. Mean number of PCB congeners by sample type in Meddybemps Lake

(SC=Staples Cove, FP= Fowler Point, MS= Eastern Surplus Site)

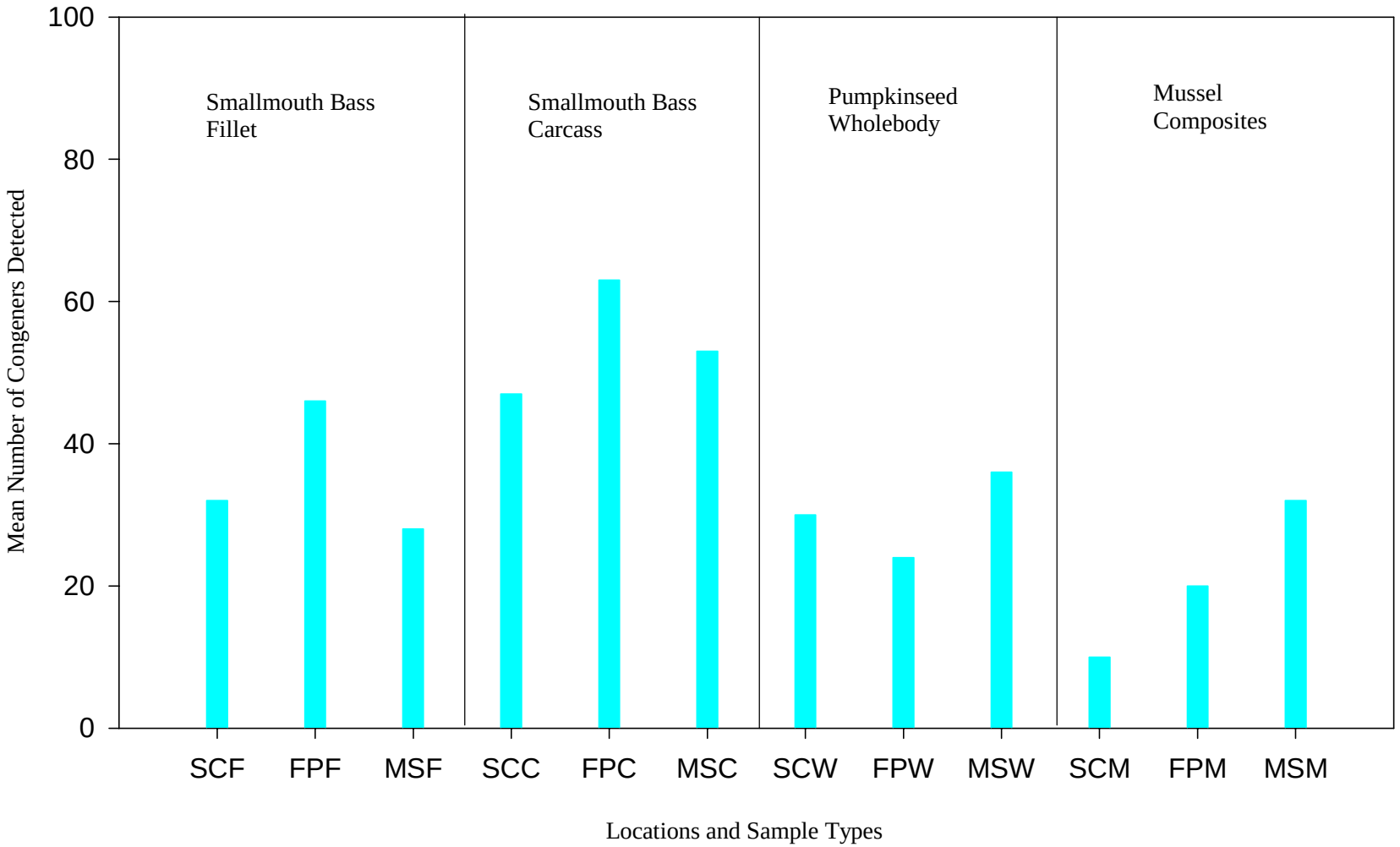


Figure 23. Mean number of PCB congeners by sample type in the Dennys and E. Machias Rivers

(ES=Eastern Surplus Site, DW=deadwater, DS=Dead Stream, EM=E. Machias)

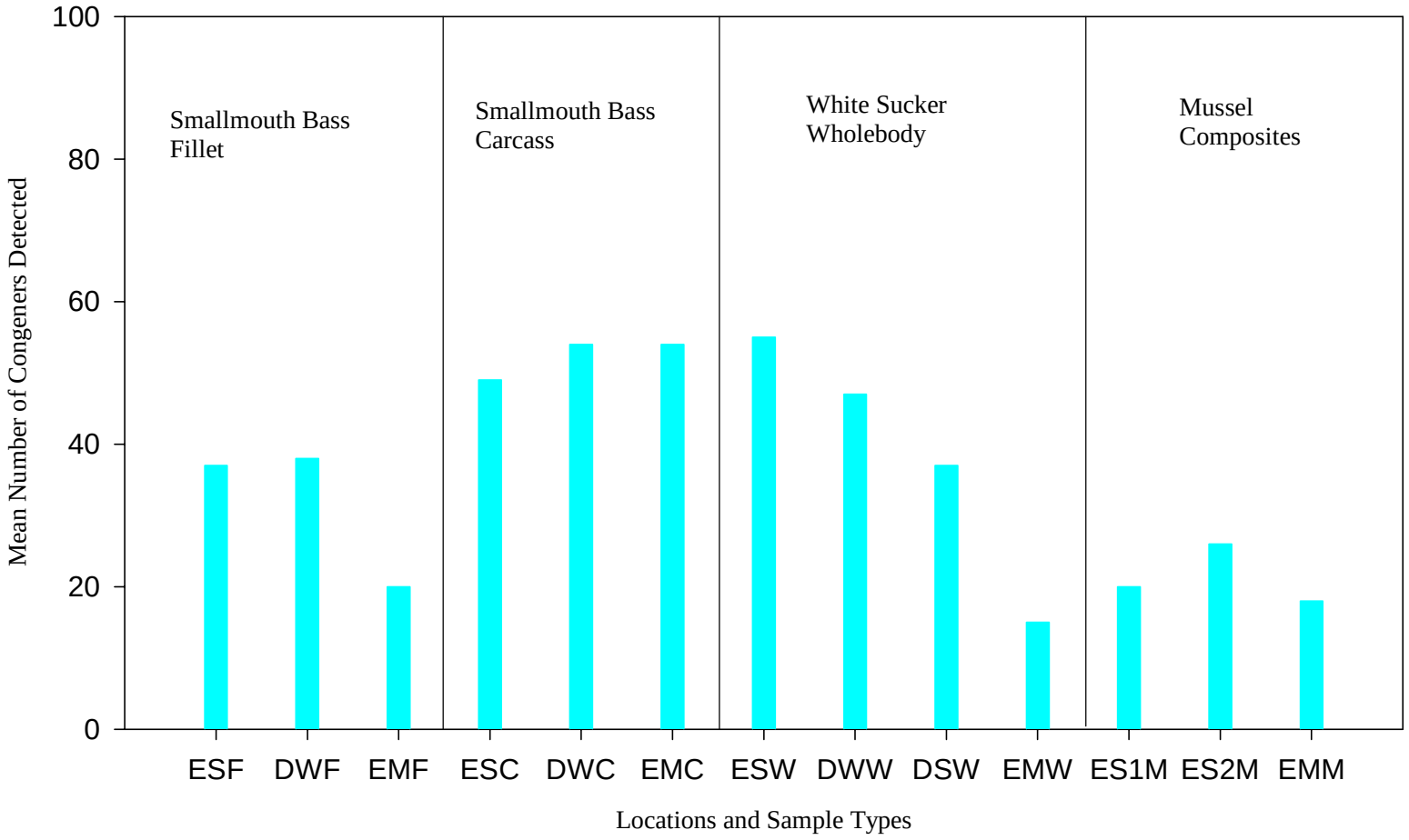
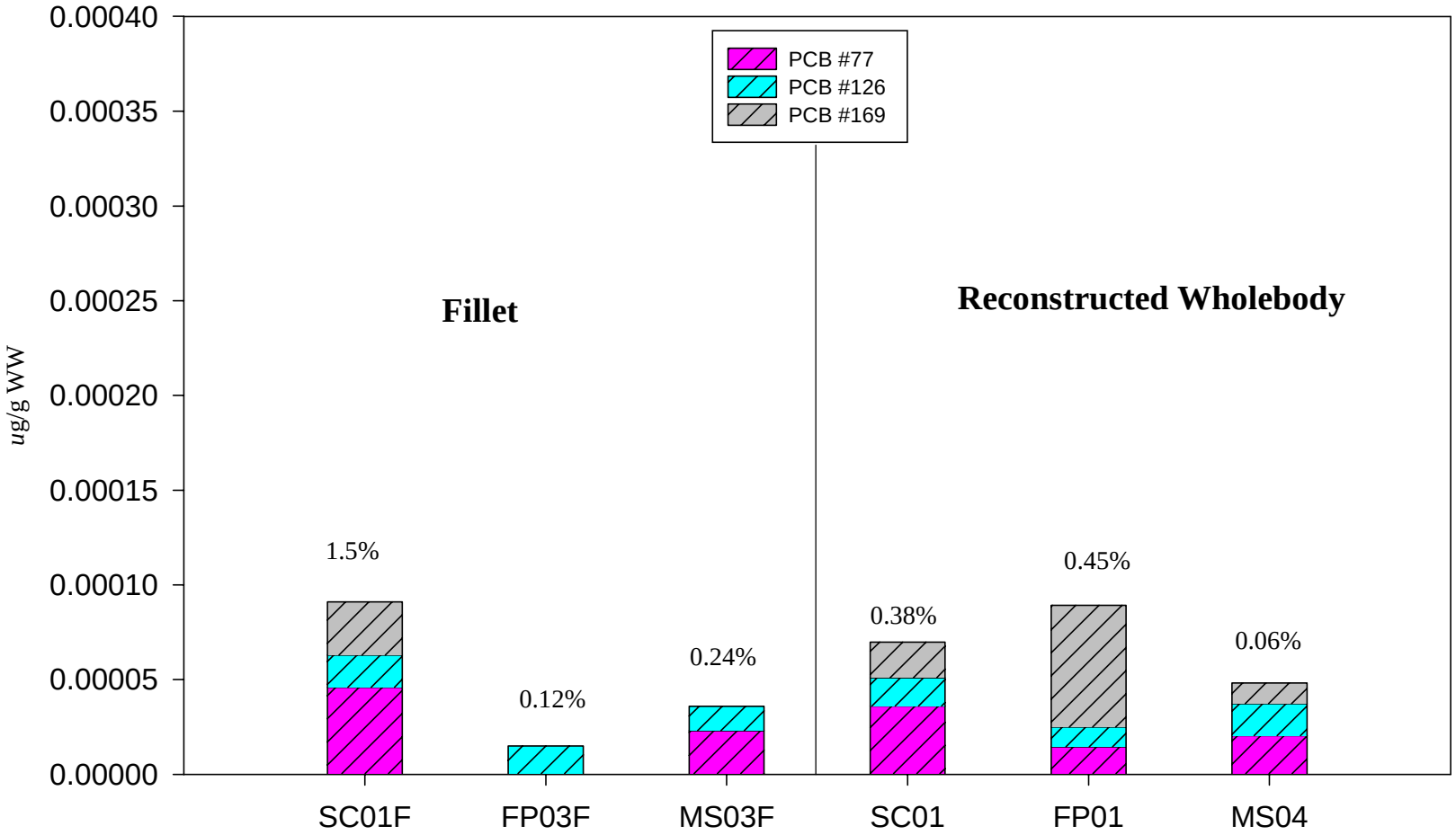
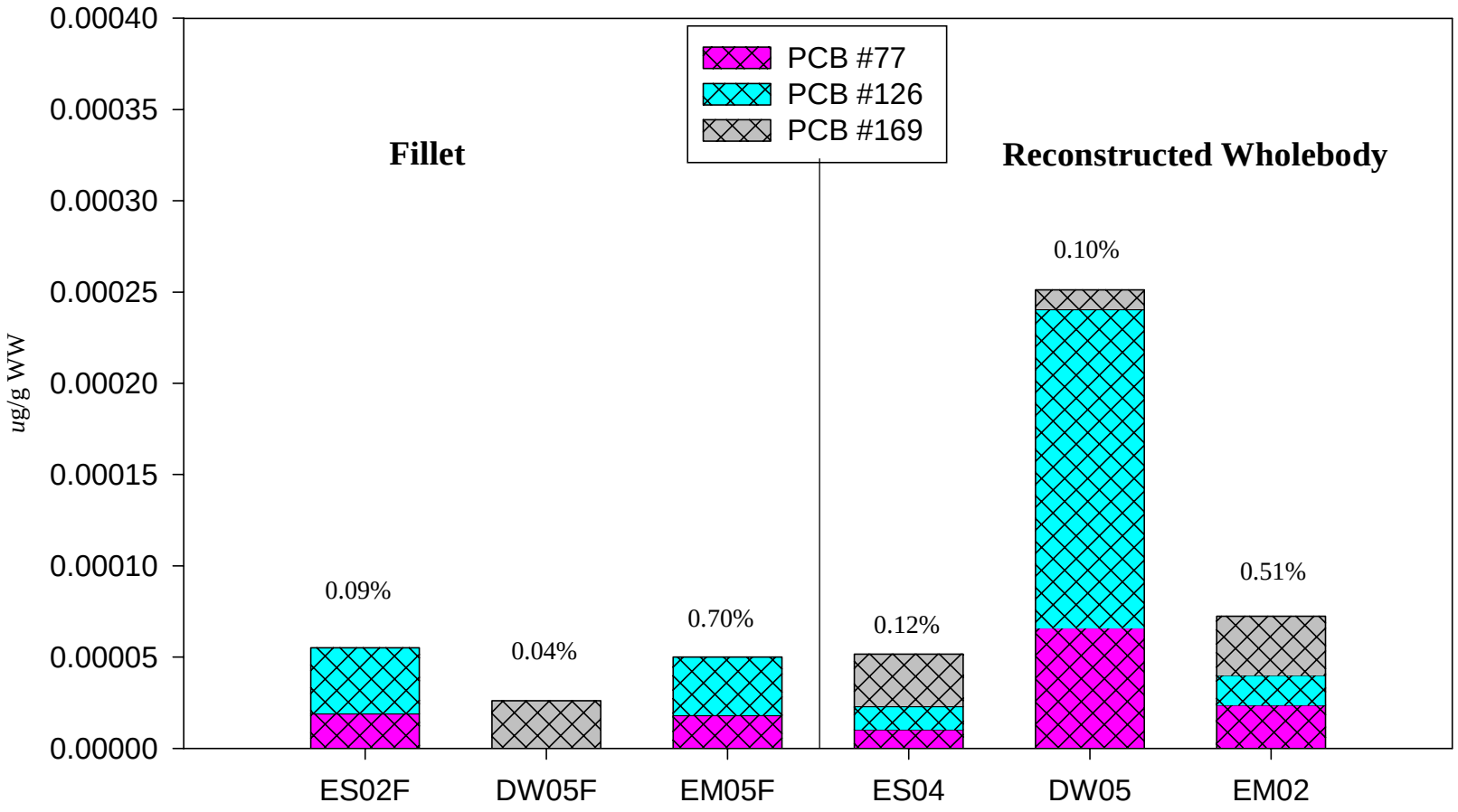


Figure 24. Non-*ortho* PCB congener concentrations in Meddybemps Lake Bass
(Samples with highest non-*ortho* concentrations at each collection location plotted.)



Non-*ortho* congeners (#77 + #126 + #169) as a percentage of Total PCB in sample noted above columns.

Figure 25. Non-*ortho* PCB congener concentrations in Dennys River and East Machias River Bass
(Samples with highest non-*ortho* concentrations at each collection location plotted)



Non-*ortho* congeners (#77+ #126+ #169) as a percentage of Total PCB in sample noted above columns.

Figure 26. Dominant PCB congeners in Meddybemps Lake Fish - Bass and Pumpkinseed
(Samples with highest total PCB concentrations plotted)

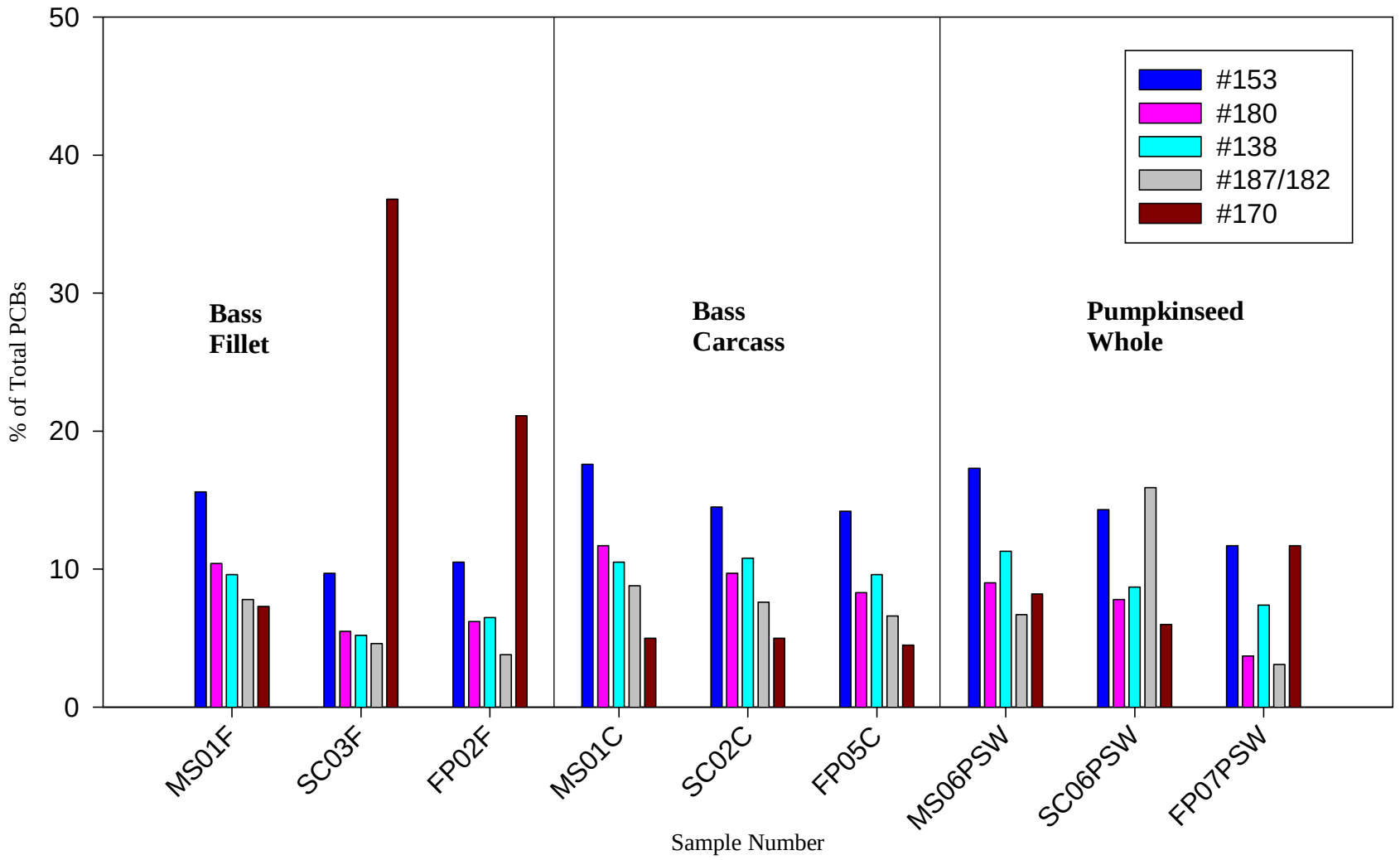


Figure 27. Dominant PCB congeners in Dennys River (ES, DW) and East Machias River (EM) Bass
(Samples with highest total PCB concentration plotted)

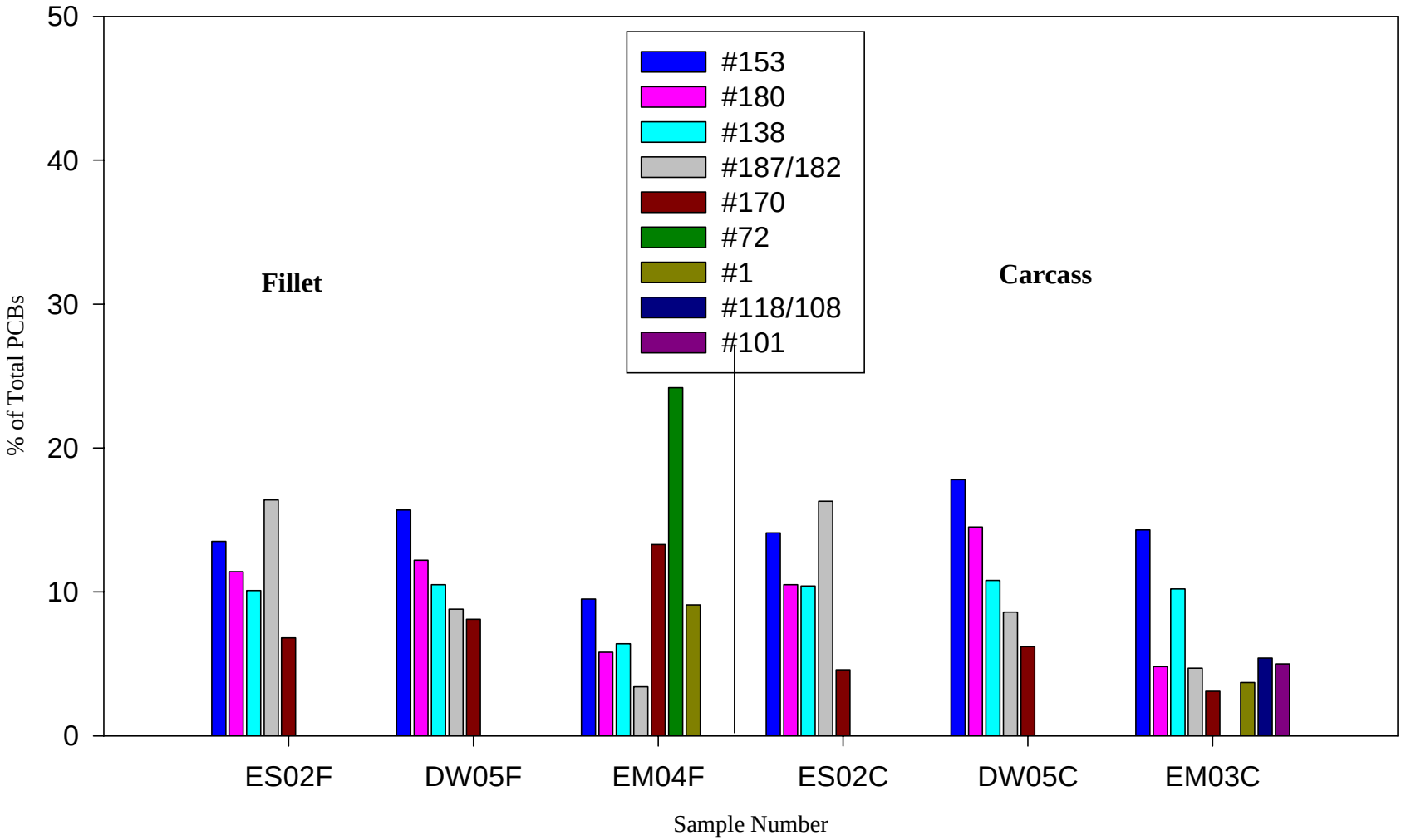


Figure 28. Dominant PCB congeners in Dennys River and East Machias Rivers White Sucker
(Samples with highest total PCB concentrations plotted)

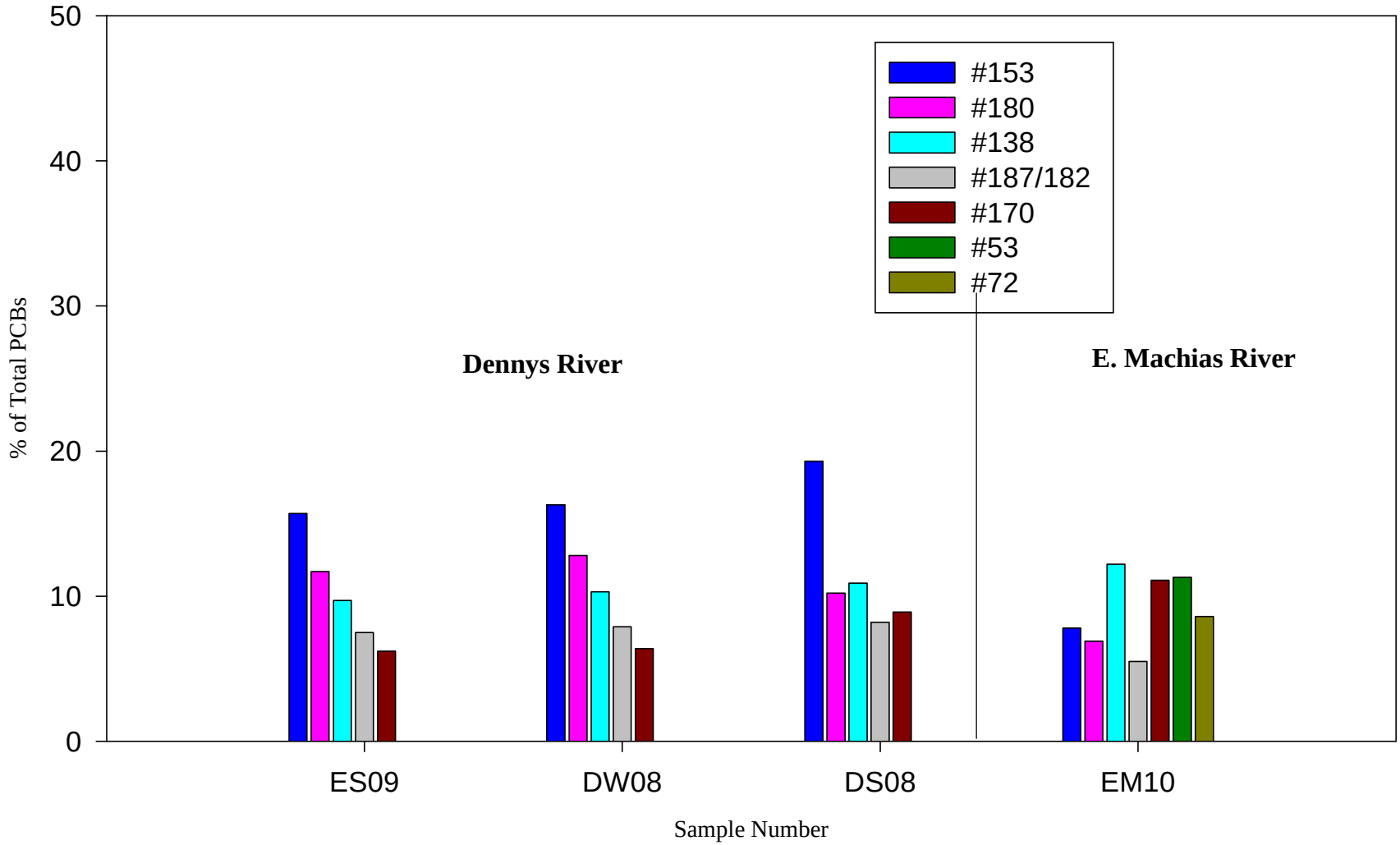
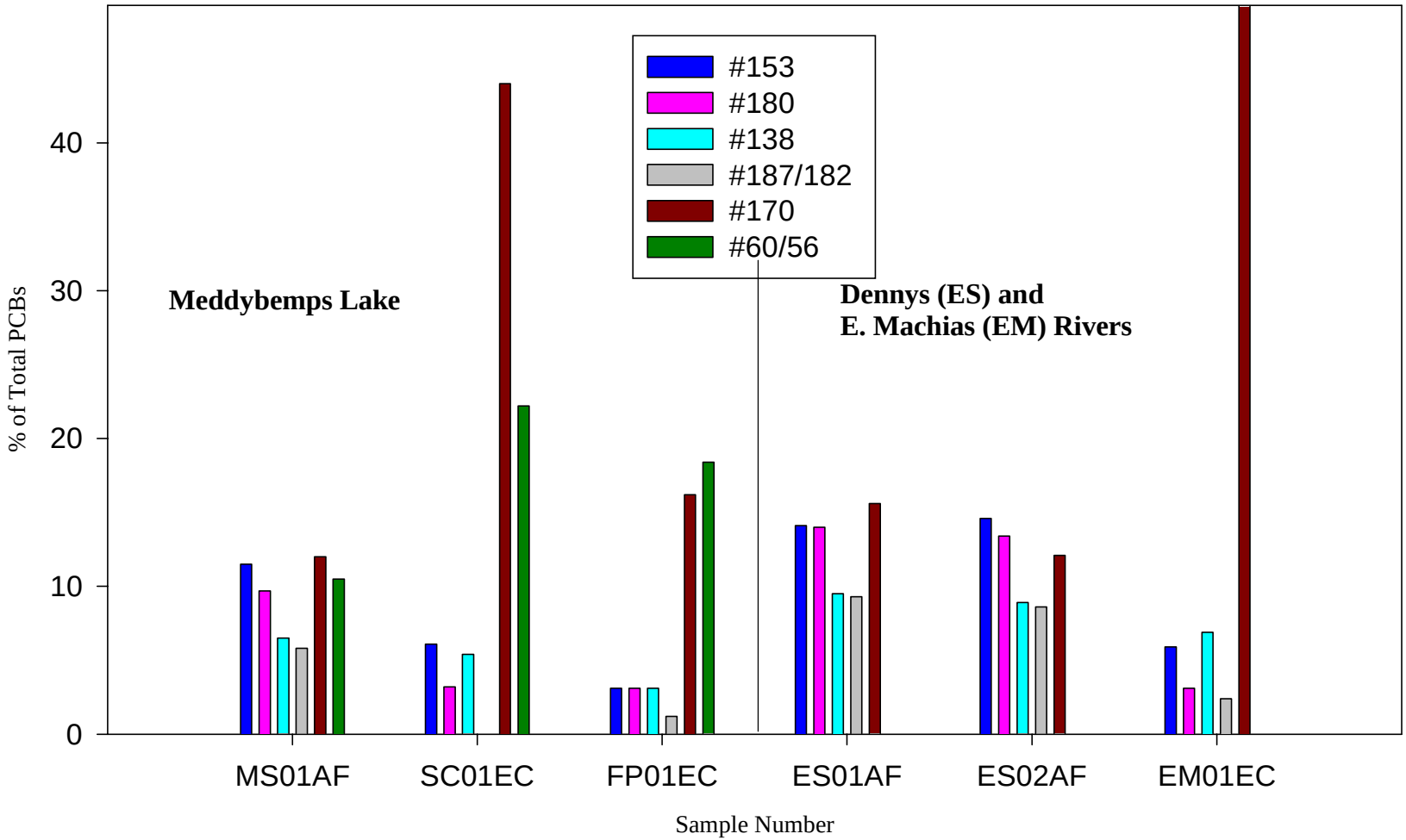


Figure 29. Dominant PCB Congeners in Meddybemps Lake, Dennys River, and E. Machias River Mussels



TABLES

Table 1. Fish and Mussel Species Observed during Sampling

Fish

Species	Meddybemps Lake	Dennys River	E. Machias River
Sea lamprey (*Petromyzon marinus*)		x	x
American eel (*Anguilla rostrata*)		x	x
Alewife (*Alosa pseudoharengus*)	x	x	x
Atlantic salmon (*Salmo salar*)	x	x	x
Brook trout (*Salvelinus fontinalis*)		x	
Chain pickerel (*Esox niger*)	x	x	x
Bridle shiner (*Notropis bifrenatus*)	x		
Golden shiner (*Notemigonus crysoleucas*)	x	x	
Fallfish (*Semotilus corporalis*)	x	x	x
White sucker (*Catostomus commersoni*)	x	x	x
Brown bullhead (*Ameiurus nebulosus*)	x	x	x
White perch (*Morone americana*)	x	x	x
Smallmouth bass (*Micropterus dolomieu*)	x	x	x
Largemouth bass (*Micropterus salmoides*)			x
Pumpkinseed (*Lepomis gibbosus*)	x	x	x
Yellow perch (*Perca flavescens*)	x	x	

Mussels

Species	Meddybemps Lake	Dennys River	E. Machias River
Eastern elliptio (*Elliptio complanata*)	x		x
Alewife floater (*Anodonta implicata*)	x	x	
Eastern floater (*Pyganodon cataracta*)	x	x	

Table 2. GPS Coordinates of Collection Locations.

Location - Species, Gear Type, Date	Latitude	Longitude
Staples Cove - Fish, Electrofishing, 9/23	not recorded	not recorded
Staples Cove - Fish, Fyke Net, 9/23-9/24 (1130-1000 hrs)	45° 06' 22.48"	67° 23' 39.52"
Staples Cove - Fish, Gill Net, 9/23 (1230-1630 hrs)	45° 06' 05.97"	67° 24' 44.65"
Staples Cove - Fish, Gill Net, 9/23 (1530-1730 hrs)	45° 06' 12.84"	67° 24' 13.62"
Staples Cove - Fish, Gill Net, 9/23 (1545-1745 hrs)	45° 06' 22.23"	67° 23' 48.16"
Staples Cove - Mussels, by hand	45° 06' 22.26"	67° 23' 41.76"
Fowler Point - Fish, Fyke Net, 9/23-9/24 (1300-1000 hrs)	45° 04' 21.90"	67° 25' 14.41"
Fowler Point - Fish, Gill Net, 9/23 (1345-1545 hrs)	not recorded	not recorded
Fowler Point - Mussels, by hand	45° 04' 21.90"	67° 25' 14.82"
E. Surplus @ Lake - Fish, Electrofishing 9/24	not recorded	not recorded
E. Surplus @ Lake - Fish, Gill Net	not recorded	not recorded
E. Surplus @ Lake - Mussels, by hand	45° 02' 24.04"	67° 21' 23.09"
E. Surplus @ Dennys River below dam - Fish, Electrofishing, 9/22	not recorded	not recorded
E. Surplus @ Dennys River below dam - Mussels, by hand	45° 02' 21.31"	67° 21' 26.99"
Dennys River below Rt. 191 - Mussels, by hand	45° 02' 15.32"	67° 21' 25.89"
Deadwater of Dennys River - Fish, Electrofishing, 9/23	not recorded	not recorded
Dead Stream Confluence - Fish, Electrofishing, 9/23	45° 00' 7.03"	67° 21' 34.09"
E. Machias River above Hadley Lake, Fish, Electrofishing, 9/24	not recorded	not recorded
E. Machias River @ Rt. 191 bridge - Fish, Angling & Gill Net, 9/26	44° 45' 54.27"	67° 23' 57.72"
E. Machias River @ Rt. 191 bridge - Mussels, by hand, 9/26	44° 45' 54.27"	67° 23' 57.72"

Coordinates recorded with Rockwell PLGR, Type HNV-560C Receiver (last encryption on 6/9/97) or estimated from topographic maps.

Table 3. Mean length, weight and lipid content* of fish

Fish Species	N	Length (cm)	Weight (g)	Lipid Content (%)
		Means ± Standard Deviation		
Smallmouth Bass	31	30.0 ± 3.38	352 ± 189.9	2.8
Brook Trout	5	21.4 ± 0.28	96 ± 6.3	3.2
Pumpkinseed	15	16.3 ± 1.21	96 ± 32.2	4.1
White Sucker	20	21.7 ± 2.67	109 ± 37.2	1.4

* Lipid content reconstructed from fillet and carcass data

Table 4. Mean length, width, breadth, weight, and lipid content of mussels.

Mussel Species	N	Length (mm)	Width (mm)	Breadth (mm)	Weight (g)	Lipid Content (%)
		Means ± Standard Deviations				
Alewife Floater	15	104.9 ± 7.0	52.6 ± 2.7	35.6 ± 2.4	110 ± 15.7	0.3
Eastern Elliptio	15	84.3 ± 7.3	45.3 ± 5.9	23.6 ± 4.1	58 ± 24.2	0.4

Table 5-1. Length, weight, lipid content, and age of individual fish and sample designations.

Fish No.	Species	Total Length (cm)	Total Weight (g)	Fillet Weight (g)	Carcass Weight (g)	Lipid (%)*	Age (Yrs)	Sample Numbers		
								Fillet	Carcass	Wholebody
Meddybemps Lake - Staples Cove										
SC01SM	Smallmouth Bass	29.9	338	98	240	3.0	5	SC01SMF	SC01SMC	
SC02SM	Smallmouth Bass	32.2	437	118	319	2.6	4	SC02SMF	SC02SMC	
SC03SM	Smallmouth Bass	29.7	299	76	223	1.8	5	SC03SMF	SC03SMC	
SC04SM	Smallmouth Bass	29.8	303	89	214	3.3	5	SC04SMF	SC04SMC	
SC05SM	Smallmouth Bass	29.0	282	82	200	1.9	5	SC05SMF	SC05SMC	
SC06PS	Pumpkinseed	15.0	70			2.8	6			SC06PSW
SC07PS	Pumpkinseed	15.8	80			2.7	4			SC07PSW
SC08PS	Pumpkinseed	15.5	77			3.0	4			SC08PSW
SC09PS	Pumpkinseed	15.6	72			4.1	4			SC09PSW
SC10PS	Pumpkinseed	15.5	79			4.2	6			SC10PSW
Meddybemps Lake - Fowler Point										
FP01SM	Smallmouth Bass	28.1	272	86	186	2.5	4	FP01SMF	FP01SMC	
FP02SM	Smallmouth Bass	31.4	306	72	234	1.0	5	FP02SMF	FP02SMC	
FP03SM	Smallmouth Bass	27.0	231	72	159	3.2	4	FP03SMF	FP03SMC	
FP04SM	Smallmouth Bass	27.9	273	87	186	3.3	4	FP04SMF	FP04SMC	
FP05SM	Smallmouth Bass	28.5	274	71	203	3.1	5	FP05SMF	FP05SMC	
FP06PS	Pumpkinseed	16.8	97			4.9	4			FP06PSW
FP07PS	Pumpkinseed	17.2	114			6.8	4			FP07PSW
FP08PS	Pumpkinseed	17.2	124			6.0	4			FP08PSW
FP09PS	Pumpkinseed	16.9	105			3.8	4			FP09PSW
FP10PS	Pumpkinseed	16.0	88			4.1	4			FP10PSW

* Lipid content in reconstructed wholebody (bass) and wholebody (pumpkinseed) fish.

Table 5-2. Length, weight, lipid content, and age of individual fish and sample designations.

Fish No.	Species	Total Length (cm)	Total Weight (g)	Fillet Weight (g)	Carcass Weight (g)	Lipid (%)*	Age (Yrs)	Sample Numbers		
								Fillet	Carcass	Wholebody
Meddybemps Lake - Eastern Surplus Site										
MS01SM	Smallmouth Bass	30.3	370	90	280	5.4	5	MS01SMF	MS01SMC	
MS02SM	Smallmouth Bass	31.6	388	95	293	2.3	5	MS02SMF	MS02SMC	
MS03SM	Smallmouth Bass	29.8	332	87	245	5.0	4	MS03SMF	MS03SMC	
MS04SM	Smallmouth Bass	28.0	303	79	224	3.8	4	MS04SMF	MS04SMC	
MS05SM	Smallmouth Bass	26.1	236	65	171	3.2	4	MS05SMF	MS05SMC	
MS06PS	Pumpkinseed	19.9	198			4.6	7			MS06PSW
MS07PS	Pumpkinseed	16.1	95			3.3	6			MS07PSW
MS08PS	Pumpkinseed	15.9	87			4.0	6			MS08PSW
MS09PS	Pumpkinseed	15.4	78			4.2	4			MS09PSW
MS10PS	Pumpkinseed	15.7	80			3.3	6			MS10PSW
Dennys River - Eastern Surplus Site										
ES01SM	Smallmouth Bass	29.0	314	76	238	1.8	7	ES01SMF	ES01SMC	
ES02SM	Smallmouth Bass	30.7	350	94	256	1.5	6	ES02SMF	ES02SMC	
ES03SM	Smallmouth Bass	30.1	318	70	248	4.0	6	ES03SMF	ES03SMC	
ES04SM	Smallmouth Bass	28.6	315	75	240	1.4	5	ES04SMF	ES04SMC	
ES05SM	Smallmouth Bass	30.0	308	85	223	1.5	5	ES05SMF	ES05SMC	
ES06WS	White Sucker	21.4	96			1.8	2			ES06WSW
ES07WS	White Sucker	18.3	58			0.8	2			ES07WSW
ES08WS	White Sucker	19.0	62			0.7	1			ES08WSW
ES09WS	White Sucker	27.3	186			0.6	2			ES09WSW
ES10WS	White Sucker	21.5	101			0.8	2			ES10WSW

* Lipid content in reconstructed wholebody (bass) and wholebody (pumpkinseed, white sucker) fish.

Table 5-3. Length, weight, lipid content, and age of individual fish and sample designations.

Fish No.	Species	Total Length (cm)	Total Weight (g)	Fillet Weight (g)	Carcass Weight (g)	Lipid (%)*	Age (Yrs)	Sample Numbers		
								Fillet	Carcass	Wholebody
Dennys River - Deadwater										
DW01SM	Smallmouth Bass	41.9	1064	117	947	6.7	7	DW01SMF	DW01SMC	
DW02SM	Smallmouth Bass	39.4	996	149	847	5.1	7	DW02SMF	DW02SMC	
DW03SM	Smallmouth Bass	30.9	312	81	231	1.3	6	DW03SMF	DW03SMC	
DW04SM	Smallmouth Bass	28.7	243	63	180	0.9	5	DW04SMF	DW04SMC	
DW05SM	Smallmouth Bass	31.4	316	92	224	0.9	4	DW05SMF	DW05SMC	
DW06WS	White Sucker	22.0	100			0.7	2			DW06WSW
DW07WS	White Sucker	24.6	143			0.5	2			DW07WSW
DW08WS	White Sucker	22.1	125			1.0	2			DW08WSW
DW09WS	White Sucker	22.0	111			0.5	2			DW09WSW
DW10WS	White Sucker	21.8	98			0.6	2			DW10WSW
Dennys River - Dead Stream confluence										
DS01BT	Brook Trout	21.0	94	55	39	4.3	2	DS01BTF	DS01BTC	
DS02BT	Brook Trout	21.7	101	56	45	3.8	2	DS02BTF	DS02BTC	
DS03BT	Brook Trout	21.3	87	46	41	3.2	2	DS03BTF	DS03BTC	
DS04BT	Brook Trout	21.6	103	53	50	2.3	2	DS04BTF	DS04BTC	
DS05BT	Brook Trout	21.3	97	48	49	2.5	2	DS05BTF	DS05BTC	
DS06WS	White Sucker	23.0	129			1.3	2			DS06WSW
DS07WS	White Sucker	24.6	151			0.7	2			DS07WSW
DS08WS	White Sucker	23.7	126			0.6	2			DS08WSW
DS09WS	White Sucker	21.9	109			1.2	2			DS09WSW
DS10WS	White Sucker	21.7	97			2.7	2			DS10WSW

* Lipid content in reconstructed wholebody (bass, trout) and wholebody (white sucker) fish.

Table 5-4. Length, weight, lipid content, and age of individual fish and sample designations.

Fish No.	Species	Total Length (cm)	Total Weight (g)	Fillet Weight (g)	Carcass Weight (g)	Lipid (%)*	Age (Yrs)	Sample Numbers		
								Fillet	Carcass	Wholebody
East Machias River - Above and Below Hadley Lake										
EM01SM	Smallmouth Bass	25.8	206	64	142	3.1	3	EM01SMF	EM01SMC	
EM02SM	Smallmouth Bass	25.9	210	72	138	2.4	3	EM02SMF	EM02SMC	
EM03SM	Smallmouth Bass	26.3	225	71	154	3.5	4	EM03SMF	EMO3SMC	
EM04SM	Smallmouth Bass	29.0	285	87	198	2.5	4	EM04SMF	EM04SMC	
EM05SM	Smallmouth Bass	30.8	365	116	249	3.1	4	EM05SMF	EMO5SMC	
EM06SM	Smallmouth Bass	32.6	435	76	359	2.5	4	EMO6SMF	EMO6SMC	
EM06WS	White Sucker	19.6	72			1.9	2			EM06WSW
EM07WS	White Sucker	18.6	78			2.1	1			EM07WSW
EM08WS	White Sucker	19.1	90			2.5	1			EM08WSW
EM09WS	White Sucker	25.7	184			2.3	2			EM09WSW
EM10WS	White Sucker	16.7	56			3.7	1			EM10WSW

* Lipid content in reconstructed wholebody (bass) and wholebody (white sucker) fish.

Table 6-1. Length, weight, and breadth of individual mussels and composite designations.

Sample No.	Species	Total Length (mm)	Total Width (mm)	Total Breadth (mm)	Total Weight (g)	Tissue Weight (g)	Total Tissue Weight (g)	Location
								Meddybemps Lake
	Eastern Elliptio	77.6	41.5	20.6	36	10		Staples Cove
	Eastern Elliptio	78.7	41.2	21.4	42	14		Staples Cove
SC01EC	Eastern Elliptio	84.0	48.0	24.8	61	15		Staples Cove
	Eastern Elliptio	75.3	41.0	19.1	35	12		Staples Cove
	Eastern Elliptio	74.6	37.4	18.6	30	9		Staples Cove
							60	
								Meddybemps Lake
	Eastern Elliptio	80.9	42.8	19.9	39	13		Fowler Point
	Eastern Elliptio	88.0	41.8	20.3	43	14		Fowler Point
FP01EC	Eastern Elliptio	85.6	43.2	23.8	56	16		Fowler Point
	Eastern Elliptio	78.7	42.6	23.4	49	16		Fowler Point
	Eastern Elliptio	77.4	38.0	19.5	36	11		Fowler Point
							70	
								Meddybemps Lake
	Alewife Floater	98.3	50.8	33.2	85	20		E. Surplus Site
	Alewife Floater	113.8	57.0	39.0	132	37		E. Surplus Site
MS01AF	Alewife Floater	115.1	50.8	37.4	108	40		E. Surplus Site
	Alewife Floater	113.4	52.2	34.5	110	24		E. Surplus Site
	Alewife Floater	109.2	50.5	37.2	121	38		E. Surplus Site
							159	
								Dennys River
	Alewife Floater	111.3	55.0	39.1	132	28		Below Dam
	Alewife Floater	107.3	53.0	37.2	119	30		Below Dam
ES01AF	Alewife Floater	99.2	53.6	36.1	109	28		Below Dam
	Alewife Floater	100.6	50.4	32.4	90	36		Below Dam
	Alewife Floater	97.8	51.1	30.4	102	22		Below Dam
							144	

Table 6-2. Length, weight, and breadth of individual mussels and composite designations.

Sample No.	Species	Total Length (mm)	Total Width (mm)	Total Breadth (mm)	Total Weight (g)	Tissue Weight (g)	Total Tissue Weight (g)	Location
								Dennys River
	Alewife Floater	98.4	53.4	35.6	108	34		Below Rt. 191 Bridge
	Alewife Floater	97.3	49.0	34.2	88	31		Below Rt. 191 Bridge
ES02AF	Alewife Floater	112.0	58.6	35.1	136	53		Below Rt. 191 Bridge
	Alewife Floater	103.6	50.3	35.9	104	34		Below Rt. 191 Bridge
	Alewife Floater	96.9	53.7	36.2	109	26		Below Rt. 191 Bridge
							178	
								E. Machias River
	Eastern Elliptio	95.4	56.4	29.1	103	26		Jacksonville Br.
	Eastern Elliptio	92.9	53	27.6	80	22		Jacksonville Br.
EM01EC	Eastern Elliptio	90.4	53.1	30.4	96	23		Jacksonville Br.
	Eastern Elliptio	89.7	50.5	29.8	87	21		Jacksonville Br.
	Eastern Elliptio	95.2	48.5	25.7	72	20		Jacksonville Br.
							112	

Table 7. Contaminants included in analytical catalog

Trace Elements	**PCB Congeners**	**PCB Congeners**	**PCB Congeners**
Aluminum	1	107/108/144	209
Arsenic	7	110	
Boron	8	114	**PCB Homologs**
Barium	15	118/108/149	Mono-
Beryllium	16/32*	119	Di-
Cadmium	18	126	Tri-
Chromium	22	128	Tetra-
Copper	24	129	Penta-
Iron	25	130	Hexa-
Mercury	26	135	Hepta-
Magnesium	28	136	Octa-
Manganese	29	138	Nona-
Molybdenum	31	141	Deca-
Nickel	33	146	
Lead	39	149	* Two or more congeners indicate
Selenium	40	151	co-eluting peaks
Strontium	41/64	153	
Vanadium	44	156/171/202	
Zinc	45	158	
	46	166	
Organochlorines	47/48	167	
Aldrin	48	169	
HCB	49	170	
Heptachlor	52	171/202	
PCB-Total	53	172	
alpha BHC	60/56	174	
alpha chlordane	63	175	
beta BHC	66	177	
cis-nonachlor	67	178	
delta-BHC	69	180	
dieldrin	70	183	
endosulfan II	72	185	
endrin	74	187/182/159	
gamma BHC	77	189	
gamma chlordane	81	191	
heptachlor epoxide	82	193	
mirex	83	194	
o,p'-DDD	84	195	
o,p'-DDE	85	196	
o,p'-DDT	87	197	
oxychlordane	92	199	
p,p'-DDD	95/80	200	
p,p'-DDE	97	201	
p,p'-DDT	99	205	
toxaphene	101	206	
trans-nonachlor	105	207	

Table 8. Summary of Contaminant Concentrations in Fillet Samples of Smallmouth Bass and Brook Trout, *u* g/g WW.

Contaminant	Meddybemps Lake			Dennys River			E. Machias River
	E. Surplus	Staples C.	Fowler Pt.	E. Surplus	Deadwater	Dead Stream	Above & Below Hadley Lake
	SmB	SmB	SmB	SmB	SmB	BKT*	SmB
	n=5	n=5	n=5	n=5	n=5	n=5	n=6
p,p'-DDE	nc	nc	nc	nc	nc	0.007	nc
PCB (Total)	0.017	0.006	0.009	0.027	0.025	0.027	0.006
As	0.52	0.23	0.34	0.18	0.33	0.21	0.39
Cd	nd	nd	nd	nd	nd	nd	nd
Cr	nc	nc	nd	0.58	nd	0.20	0.16
Cu	0.94	0.27	0.16	0.62	0.25	0.38	0.37
Hg	0.21	0.41	0.30	0.31	0.60	0.09	0.41
Ni	nc	nd	nc	nd	nd	nc	nc
Pb	nc	nc	nd	nd	nd	nd	nd
Se	0.17	nc	nc	0.11	0.14	nc	0.23
Zn	4.26	3.55	3.71	4.45	3.85	10.31	3.88

nd = non-detect, nc = not calculated (i.e., too few detections)
SmB - Smallmouth Bass, BKT - Brook Trout
* Skin-on fillet, all SmB fillets skinless and boneless.

Table 9. Summary of Contaminant Concentrations in Reconstructed Wholebody Smallmouth Bass and Brook Trout, *u* g/g WW.

Contaminant	Meddybemps Lake			Dennys River			E. Machias River
	E. Surplus	Staples C.	Fowler Pt.	E. Surplus	Deadwater	Dead Stream	Above & Below Hadley Lake
	SmB	SmB	SmB	SmB	SmB	BKT	SmB
	n=5	n=5	n=5	n=5	n=5	n=5	n=6
p,p'-DDE	0.005	0.005	0.006	0.006	0.008	0.009	0.006
PCB (Total)	0.084	0.019	0.026	0.091	0.168	0.032	0.023
As	0.33	0.20	0.32	0.12	0.29	0.24	0.22
Cd	0.02	nc	nc	nc	nc	nc	0.03
Cr	0.26	0.35	0.85	0.38	0.28	0.25	0.66
Cu	0.93	0.62	0.30	0.49	0.34	0.94	0.47
Hg	0.18	0.29	0.24	0.25	0.39	0.07	0.36
Ni	nc	nc	nc	nc	nc	nc	nc
Pb	nc	nc	nd	nd	nd	nd	nc
Se	0.10	nc	nc	0.08	0.13	nc	0.14
Zn	15.43	13.92	13.17	16.08	14.59	20.10	13.18

nd = non-detect, nc = not calculated
SmB - Smallmouth Bass, BKT - Brook Trout

Table 10. Summary of Contaminant Concentrations in Wholebody Pumpkinseed and White Sucker , *u* g/g WW.

Contaminant	Meddybemps Lake			Dennys River			E. Machias River
	E. Surplus	Staples C.	Fowler Pt.	E. Surplus	Deadwater	Dead Stream	Above & Below Hadley Lake
	PS=5	PS=5	PS=5	WS=5	WS=5	WS=5	WS=5
p,p'-DDE	0.002	0.003	0.002	0.001	0.001	0.004	nc
PCB (Total)	0.013	0.007	0.006	0.054	0.052	0.032	0.012
As	0.30	0.33	nc	nc	nc	nc	0.34
Cd	0.04	0.04	0.03	0.03	0.03	nc	0.04
Cr	0.27	0.23	0.30	0.28	0.30	0.34	0.61
Cu	0.64	0.40	0.31	0.67	0.47	0.56	0.79
Hg	0.08	0.08	0.07	0.12	0.11	0.08	0.11
Ni	nc	nc	nd	nd	nc	nc	nc
Pb	nd	nc	nc	nc	nd	nc	nc
Se	nd	nd	nd	nc	nd	nd	nd
Zn	19.0	19.4	20.1	18.9	20.1	16.4	18.3

nd = non-detect, nc = not calculated

Table 11. Summary of Contaminant Concentrations in Freshwater Mussel Composites by Collection Location, *u* g/g WW

Contaminant	Meddybemps Lake			Dennys River		E. Machias River
	E. Surplus	Staples C.	Fowler Pt.	E. Surplus	Below Rt. 191 Bridge (Meddybemps)	Above Rt. 191 Bridge (Jacksonville)
	AF	EC	EC	AF	AF	EC
p,p'-DDE	nd	nd	nd	nd	nd	nd
PCB (Total)	0.004	0.001	0.004	0.005	0.010	0.002
As	0.75	0.52	0.99	0.70	0.75	0.68
Cd	0.51	0.27	0.48	0.59	0.39	0.73
Cr	0.30	0.25	0.27	0.35	0.62	0.34
Cu	0.58	0.69	0.93	0.52	0.95	1.40
Hg	nd	0.03	0.04	nd	nd	0.10
Ni	0.06	0.24	0.20	0.14	0.09	0.46
Pb	0.20	0.29	0.49	0.27	0.19	0.79
Se	nd	0.14	0.23	0.12	nd	0.35
Zn	14.40	13.40	15.40	16.10	16.60	17.80

nd = non-detect
Each sample was a composite of 5 mussels (same species, similar size).
Species: AF - alewife floater, EC - eastern elliptio

Appendix A. Trace elements, Tables A-1 through A-10.

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Table A-1. Trace elements in fillet samples of smallmouth bass from Meddybemps Lake.

Table A-2. Trace elements in fillet samples of smallmouth bass and brook trout from the Dennys River.

Table A-3. Trace elements in fillet samples of smallmouth bass from the East Machias River.

Table A-4. Trace elements in reconstructed wholebody smallmouth from Meddybemps Lake.

Table A-5. Trace elements in reconstructed wholebody smallmouth bass and brook trout from the Dennys River.

Table A-6. Trace elements in reconstructed wholebody smallmouth bass from the East Machias River.

Table A-7. Trace elements in wholebody samples of pumpkinseed from Meddybemps Lake.

Table A-8. Trace elements in wholebody samples of white sucker from the Dennys River.

Table A-9. Trace elements in wholebody sample of white sucker from the East Machias River.

Table A-10. Trace elements in freshwater mussel composite samples from Meddybemps Lake, the Dennys River, and East Machias River.

Table A-1. Trace elements in **FILLET** Samples of Smallmouth Bass from Meddybemps Lake, *u* g/g WW.

Sample No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Meddybemps Lake @ Eastern Surplus Site									
MS01SMF	0.315	nd	nd	0.663	0.213	nd	nd	0.114	3.96
MS02SMF	0.108	nd	nd	0.373	0.302	nd	nd	0.054	3.46
MS03SMF	0.660	nd	0.133	2.280	0.200	0.123	0.126	0.236	5.36
MS04SMF	0.935	nd	nd	0.942	0.210	nd	nd	0.211	4.09
MS05SMF	0.558	nd	0.502	0.441	0.136	0.189	nd	0.256	4.44
Mean	0.515	nd	nc	0.940	0.212	nc	nc	0.174	4.26
Meddybemps Lake @ Staple Cove (Lake Reference Site)									
SC01SMF	0.143	nd	nd	0.267	0.322	nd	nd	nd	3.75
SC02SMF	0.736	nd	nd	0.265	0.354	nd	nd	0.270	3.09
SC03SMF	0.054	nd	nd	0.208	0.449	nd	nd	nd	3.41
SC04SMF	0.148	nd	nd	0.288	0.506	nd	nd	0.152	3.57
SC05SMF	0.054	nd	0.220	0.315	0.422	nd	0.218	nd	3.93
Mean	0.227	nd	nc	0.269	0.411	nd	nc	nc	3.55
Meddybemps Lake @ Fowler Point									
FP01SMF	0.149	nd	nd	0.236	0.234	nd	nd	0.213	4.24
FP02SMF	0.362	nd	nd	0.249	0.313	nd	nd	0.263	3.73
FP03SMF	0.233	nd	nd	0.057	0.319	0.125	nd	nd	3.84
FP04SMF	0.526	nd	nd	0.054	0.247	nd	nd	nd	3.27
FP05SMF	0.421	nd	nd	0.213	0.363	nd	nd	nd	3.48
Mean	0.338	nd	nd	0.162	0.295	nc	nd	nc	3.71
Grand Mean	0.360	nd	nc	0.457	0.306	nc	nc	nc	3.84

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Value listed is one-half the sample detection limit.

Table A-2. Trace elements in **FILLET** Samples of Smallmouth Bass and Brook Trout from the Dennys River, *u* g/g WW.

Sample No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Denny River @ Eastern Surplus Site									
ES01SMF	0.385	nd	2.490	1.420	0.232	nd	nd	0.170	4.62
ES02SMF	0.209	nd	0.052	0.211	0.313	nd	nd	0.143	4.09
ES03SMF	0.058	nd	0.148	0.845	0.350	nd	nd	0.058	4.55
ES04SMF	0.195	nd	0.051	0.270	0.229	nd	nd	0.140	3.54
ES05SMF	0.051	nd	0.146	0.373	0.402	nd	nd	0.0505	5.46
Mean	0.180	nd	0.577	0.624	0.305	nd	nd	0.112	4.45
Dennys River @ Deadwater									
DW01SMF	0.323	nd	nd	0.314	0.871	nd	nd	0.327	3.86
DW02SMF	0.236	nd	nd	0.251	0.612	nd	nd	0.176	3.44
DW03SMF	0.334	nd	nd	0.252	0.376	nd	nd	0.051	3.57
DW04SMF	0.193	nd	nd	0.282	0.468	nd	nd	0.113	4.12
DW05SMF	0.555	nd	nd	0.163	0.655	nd	nd	0.051	4.25
Mean	0.328	nd	nd	0.252	0.596	nd	nd	0.144	3.85
Grand Mean	0.254	nd	nc	0.438	0.451	nd	nd	0.128	4.15
Dennys River @ Dead Stream - Brook Trout									
DS01BTF	0.199	nd	0.336	0.370	0.073	0.222	nd	nd	10.70
DS02BTF	0.129	nd	0.136	0.377	0.114	nd	nd	nd	8.93
DS03BTF	0.067	nd	0.163	0.483	0.079	nd	nd	0.344	10.70
DS04BTF	0.283	nd	0.167	0.296	0.088	nd	nd	nd	9.82
DS05BTF	0.367	nd	0.174	0.380	0.074	0.222	nd	0.226	11.40
Mean	0.209	nd	0.195	0.381	0.086	nc	nd	nc	10.31

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Value listed is one-half the sample detection limit.

Table A-3. Trace elements in **FILLET** samples of Smallmouth Bass from the East Machias River, *u* g/g WW.

Sample No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
East Machias River (Riverine Reference Site)									
EM01SMF	0.056	nd	0.143	0.288	0.254	nd	nd	0.157	3.54
EM02SMF	0.292	nd	0.058	0.276	0.501	nd	nd	0.309	3.52
EM03SMF	0.293	nd	0.210	0.299	0.322	nd	nd	0.256	4.47
EM04SMF	0.363	nd	0.122	0.427	0.022	nd	nd	0.415	4.07
EM05SMF	0.782	nd	0.254	0.058	0.659	0.154	nd	0.183	3.28
EM06SMF	0.533	nd	0.148	0.866	0.701	nd	nd	0.057	4.37
Mean	0.387	nd	0.156	0.369	0.410	nc	nd	0.229	3.88

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Value listed is one-half the sample detection limit.

Table A-4. Trace elements in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from Meddybemps Lake, *u* g/g WW.

Fish No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Meddybemps Lake @ Eastern Surplus Site									
MS01SM	0.425	0.025	0.162	0.948	0.173	nd	nd	0.083	14.963
MS02SM	0.209	0.032	0.304	0.780	0.212	nd	nd	0.069	17.007
MS03SM	0.230	0.016	0.243	1.093	0.136	0.089	0.090	0.119	15.426
MS04SM	0.553	0.014	0.266	0.793	0.243	nd	nd	0.108	14.743
MS05SM	0.207	0.024	0.327	1.049	0.131	0.105	nd	0.123	14.990
Mean	0.325	0.022	0.260	0.933	0.179	nc	nc	0.100	15.426
Meddybemps Lake @ Staple Cove (Lake Reference Site)									
SC01SM	0.171	nd	0.684	0.461	0.218	nd	nd	nd	12.803
SC02SM	0.248	0.023	0.340	1.583	0.164	0.191	nd	0.122	14.485
SC03SM	0.0695	nd	0.305	0.292	0.378	nd	0.117	nd	14.515
SC04SM	0.094	nd	0.189	0.339	0.397	nd	nd	0.095	13.550
SC05SM	0.415	nd	0.246	0.420	0.267	0.407	0.114	nd	14.263
Mean	0.200	nc	0.353	0.619	0.285	nc	nc	nc	13.923
Meddybemps Lake @ Fowler Point									
FP01SM	0.096	nd	0.219	0.427	0.168	nd	nd	0.117	10.846
FP02SM	0.138	nd	0.240	0.243	0.306	nd	nd	0.114	14.489
FP03SM	0.124	0.024	0.267	0.150	0.248	0.090	nd	nd	13.793
FP04SM	0.771	nd	3.294	0.224	0.195	0.228	nd	nd	13.306
FP05SM	0.485	nd	0.230	0.446	0.270	nd	nd	nd	13.423
Mean	0.323	nc	0.850	0.298	0.237	nc	nd	nc	13.171
Grand Mean	0.282	nc	0.488	0.617	0.234	nc	nc	nc	14.173

nd = non-detect

Shaded cells indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

If both fillet and carcass samples were non-detects, one half the sample detection limit of the carcass was used in the computation of the mean.

Those cells are shaded and bordered with a line.

Table A-5. Trace elements in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass and Brook Trout from the Dennys River, *u* g/g WW.

Fish No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Denny River @ Eastern Surplus Site - Smallmouth Bass									
ES01SM	0.142	0.036	0.875	0.576	0.204	nd	nd	0.091	17.945
ES02SM	0.174	0.023	0.140	0.173	0.252	0.181	nd	0.084	13.898
ES03SM	0.133	nd	0.277	0.905	0.358	0.199	nd	0.073	16.131
ES04SM	0.094	nd	0.244	0.371	0.239	nd	nd	0.081	16.462
ES05SM	0.063	0.030	0.339	0.433	0.213	nd	nd	0.063	15.987
Mean	0.121	nc	0.375	0.492	0.253	nc	nd	0.078	16.085
Dennys River @ Deadwater - Smallmouth Bass									
DW01SM	0.640	nd	0.075	0.415	0.471	nd	nd	0.366	11.283
DW02SM	0.250	nd	0.218	0.299	0.424	0.181	nd	0.087	10.804
DW03SM	0.138	nd	0.296	0.279	0.340	0.121	nd	0.070	15.660
DW04SM	0.098	0.024	0.377	0.354	0.259	nd	nd	0.077	17.883
DW05SM	0.338	nd	0.413	0.345	0.464	0.121	nd	0.069	17.328
Mean	0.293	nc	0.276	0.338	0.392	nc	nd	0.134	14.592
Grand Mean	0.207	nc	0.325	0.415	0.322	nc	nd	nc	15.338
Dennys River @ Dead Stream - Brook Trout									
DS01BT	0.389	nd	0.321	1.366	0.055	0.160	nd	nd	18.459
DS02BT	0.207	nd	0.192	0.643	0.097	nd	nd	nd	18.451
DS03BT	0.071	0.021	0.273	0.887	0.055	nd	nd	0.215	19.607
DS04BT	0.271	0.021	0.234	0.968	0.059	nd	nd	nd	22.869
DS05BT	0.259	nd	0.206	0.825	0.074	0.141	nd	0.175	21.099
Mean	0.239	nc	0.245	0.938	0.068	nc	nd	nc	20.097

nd = non-detect

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

If both fillet and carcass samples were non-detects, one half the sample detection limit of the carcass was used in the computation of the mean.

Those cells are shaded and bordered with a line.

Table A-6. Trace elements in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from the East Machias River, *u* g/g WW.

Fish No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
East Machias River (Riverine Reference Site)									
EM01SM	0.161	0.053	0.304	0.332	0.171	nd	nd	0.100	12.818
EM02SM	0.151	0.045	0.374	0.358	0.376	nd	0.122	0.157	14.875
EM03SM	0.366	0.0150	1.716	0.255	0.272	nd	nd	0.132	11.814
EM04SM	0.162	0.034	0.706	0.492	0.365	0.452	nd	0.177	14.165
EM05SM	0.303	0.030	0.650	0.317	0.420	0.104	nd	0.113	12.162
EM06SM	0.153	0.026	0.189	1.084	0.582	nd	nd	0.152	13.225
Mean	0.216	0.034	0.657	0.473	0.364	nc	nc	0.139	13.177

nd = non-detect, nc = not calculated

Shaded cells indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

If both fillet and carcass samples were non-detects, one half the sample detection limit of the carcass was used in the computation of the mean.

Those cells are shaded and bordered with a line.

Table A-7. Trace elements in **WHOLEBODY** samples of Pumpkinseed from Meddybemps Lake, *u* g/g WW.

Sample No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Meddybemps Lake @ Eastern Surplus Site									
MS06PSW	0.839	0.044	0.255	0.308	0.118	nd	nd	nd	16.6
MS07PSW	0.066	0.026	0.296	0.259	0.094	nd	nd	nd	23.3
MS08PSW	0.066	0.026	0.259	1.180	0.060	nd	nd	nd	17.9
MS09PSW	0.205	0.048	0.299	0.372	0.027	nd	nd	nd	21.2
MS10PSW	0.335	0.029	0.253	1.080	0.093	0.197	nd	nd	15.9
Mean	0.302	0.035	0.272	0.640	0.078	nc	nd	nd	19.0
Meddybemps Lake @ Staples Cove (Lake Reference Site)									
SC06PSW	0.338	0.041	0.207	0.354	0.081	nd	0.135	nd	21.1
SC07PSW	0.065	0.026	0.231	0.364	0.103	nd	nd	nd	19.2
SC08PSW	0.338	0.026	0.177	0.236	0.064	nd	nd	nd	20.9
SC09PSW	0.159	0.047	0.252	0.376	0.028	nd	nd	nd	19.3
SC10PSW	0.728	0.059	0.272	0.669	0.122	0.140	nd	nd	16.7
Mean	0.326	0.040	0.228	0.400	0.080	nc	nc	nd	19.4
Meddybemps Lake @ Fowler Point									
FP06PSW	0.203	0.028	0.388	0.309	0.070	nd	nd	nd	19.9
FP07PSW	0.629	0.040	0.317	0.282	0.059	nd	nd	nd	18.4
FP08PSW	nd	0.015	0.336	0.308	0.090	nd	0.184	nd	20.3
FP09PSW	nd	0.014	0.190	0.372	0.083	nd	nd	nd	22.3
FP10PSW	nd	0.032	0.256	0.299	0.063	nd	nd	nd	19.7
Mean	nc	0.026	0.297	0.314	0.073	nd	nc	nd	20.1
Grand Mean	nc	0.033	0.266	0.451	0.077	nc	nc	nd	19.513

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

Table A-8. Trace elements in **WHOLEBODY** samples of White Sucker from the Dennys River, *u* g/g WW.

Sample No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Dennys River @ Eastern Surplus Site									
ES06WSW	nd	0.033	0.268	0.509	0.269	nd	nd	nd	15.4
ES07WSW	nd	0.037	0.321	0.723	0.078	nd	nd	nd	21.2
ES08WSW	nd	0.023	0.317	1.050	0.065	nd	0.136	nd	22.3
ES09WSW	0.486	0.026	0.125	0.572	0.088	nd	nd	0.103	17.1
ES10WSW	nd	0.032	0.379	0.481	0.122	nd	nd	nd	18.5
Mean	nc	0.030	0.282	0.667	0.124	nd	nc	nc	18.9
Dennys River @ Deadwater									
DW06WSW	nd	0.021	0.278	0.322	0.159	nd	nd	nd	18.8
DW07WSW	nd	0.021	0.309	0.482	0.094	nd	nd	nd	23.1
DW08WSW	nd	0.021	0.252	0.506	0.090	0.107	nd	nd	19.9
DW09WSW	0.107	0.034	0.311	0.369	0.073	nd	nd	nd	20.9
DW10WSW	nd	0.032	0.332	0.672	0.131	nd	nd	nd	17.7
Mean	nc	0.026	0.296	0.470	0.109	nc	nd	nd	20.1
Dennys River @ Dead Stream									
DS06WSW	nd	nd	0.321	0.670	0.093	nd	nd	nd	18.1
DS07WSW	nd	0.036	0.188	0.503	0.108	nd	nd	nd	14.6
DS08WSW	nd	nd	0.191	0.544	0.083	0.152	nd	nd	16.9
DS09WSW	0.174	nd	0.281	0.508	0.054	nd	nd	nd	15.9
DS10WSW	nd	nd	0.695	0.564	0.068	nd	0.113	nd	16.3
Mean	nc	nc	0.335	0.558	0.081	nc	nc	nd	16.4
Grand Mean	nc	nc	0.305	0.565	0.105	nc	nc	nc	18.4

nd = non-detect, nc = not calculated

Table A-9. Trace elements in **WHOLEBODY** samples of White Sucker from the East Machias River, *u* g/g WW.

Sample No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
East Machias River (Riverine Reference Site)									
EM06WSW	0.552	0.024	2.080	0.317	0.156	0.328	nd	nd	24.1
EM07WSW	0.423	0.041	0.245	0.391	0.074	nd	nd	nd	16.5
EM08WSW	0.410	0.051	0.206	1.320	0.021	0.135	nd	nd	15.6
EM09WSW	0.057	0.068	0.185	0.616	0.188	nd	nd	nd	17.4
EM10WSW	0.278	0.028	0.317	1.290	0.090	nd	0.120	nd	17.9
Mean	0.344	0.042	0.607	0.787	0.106	nc	nc	nd	18.3

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

Table A-10. Trace elements in Freshwater **Mussel Composite** Samples from Meddybemps Lake, the Dennys River, and East Machias River, *u* g/g WW.

Sample No.	Location	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
MS01AF	Meddybemps Lake	0.748	0.509	0.302	0.577	nd	0.057	0.195	nd	14.4
SC01EC	Meddybemps Lake	0.523	0.270	0.245	0.687	0.027	0.235	0.288	0.140	13.4
FP01EC	Meddybemps Lake	0.991	0.483	0.265	0.926	0.036	0.197	0.489	0.227	15.4
Mean		0.754	0.421	0.271	0.730	nc	0.163	0.324	nc	14.4
ES01AF	Dennys River	0.695	0.592	0.345	0.516	nd	0.144	0.266	0.117	16.1
ES02AF	Dennys River	0.746	0.392	0.616	0.951	nd	0.093	0.191	nd	16.6
Mean		0.721	0.492	0.481	0.734	nd	0.118	0.229	nc	16.4
EM01EC	E. Machias River	0.675	0.725	0.344	1.400	0.104	0.457	0.790	0.345	17.8

Each sample was a composite of 5 mussels (same species, similar size).
nd = non-detect, nc = not calculated

Appendix B. Organochlorines, Tables B-1 through B-10.

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Table B-1. Organochlorines in fillet samples of smallmouth bass from Meddybemps Lake.

Table B-2. Organochlorines in fillet samples of smallmouth bass and brook trout from the Dennys River.

Table B-3. Organochlorines in fillet samples of smallmouth bass from the East Machias River.

Table B-4. Organochlorines in reconstructed wholebody smallmouth bass from Meddybemps Lake.

Table B-5. Organochlorines in reconstructed wholebody smallmouth bass and brook trout from the Dennys River.

Table B-6. Organochlorines in reconstructed wholebody smallmouth bass from the East Machias River.

Table B-7. Organochlorines in wholebody samples of pumpkinseed from Meddybemps Lake.

Table B-8. Organochlorines in wholebody samples of white sucker from the Dennys River.

Table B-9. Organochlorines in wholebody samples of white sucker from the East Machias River.

Table B-10. Organochlorines in freshwater mussel composite samples from Meddybemps Lake, the Dennys River, and East Machias River.

Table B-1. Organochlorines in **FILLET** samples of Smallmouth Bass from Meddybemps Lake, *u* g/g WW.

Sample No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	p,p' DDT	Total PCBs*
Meddybemps Lake @ Eastern Surplus Site								
MS01SMF	nd	nd	nd	nd	nd	nd	nd	0.0380
MS02SMF	nd	nd	nd	nd	nd	nd	nd	0.0134
MS03SMF	nd	nd	nd	nd	nd	0.0010	nd	0.0148
MS04SMF	nd	nd	nd	nd	nd	nd	nd	0.0140
MS05SMF	nd	nd	nd	nd	nd	nd	nd	0.0067
Mean	nd	nd	nd	nd	nd	nc	nd	0.0174
Meddybemps Lake @ Staple Cove (Lake Reference Site)								
SC01SMF	nd	nd	nd	nd	nd	0.0019	nd	0.0060
SC02SMF	nd	nd	nd	nd	nd	nd	nd	0.0062
SC03SMF	nd	nd	nd	nd	nd	nd	nd	0.0063
SC04SMF	nd	nd	nd	nd	nd	nd	nd	0.0042
SC05SMF	nd	nd	nd	nd	nd	nd	nd	0.0058
Mean	nd	nd	nd	nd	nd	nc	nd	0.0057
Meddybemps Lake @ Fowler Point								
FP01SMF	nd	nd	nd	nd	nd	nd	nd	0.0056
FP02SMF	nd	nd	nd	nd	nd	0.0025	nd	0.0132
FP03SMF	nd	nd	nd	nd	nd	0.0023	nd	0.0125
FP04SMF	nd	nd	nd	nd	nd	nd	nd	0.0058
FP05SMF	nd	nd	nd	nd	nd	nd	nd	0.0082
Mean	nd	nd	nd	nd	nd	nc	nd	0.0091
Grand Mean	nd	nd	nd	nd	nd	nc	nd	0.0107

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

* Based on congener-specific analyses

Table B-2. Organochlorines in **FILLET** samples of Smallmouth Bass and Brook Trout from the Dennys River, ug/g WW.

Sample No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	p,p' DDT	Total PCBs*
Denny River @ Eastern Surplus Site								
ES01SMF	nd	nd	nd	nd	nd	nd	nd	0.0160
ES02SMF	nd	nd	nd	nd	nd	0.0020	nd	0.0623
ES03SMF	nd	nd	nd	nd	nd	0.0023	nd	0.0230
ES04SMF	nd	nd	nd	nd	nd	nd	nd	0.0143
ES05SMF	nd	nd	nd	nd	nd	nd	nd	0.0196
Mean	nd	nd	nd	nd	nd	nc	nd	0.0270
Dennys River @ Deadwater								
DW01SMF	nd	nd	nd	nd	nd	nd	nd	0.0231
DW02SMF	nd	nd	nd	nd	nd	0.0019	nd	0.0243
DW03SMF	nd	nd	nd	nd	nd	nd	nd	0.0123
DW04SMF	nd	nd	nd	nd	nd	nd	nd	0.0084
DW05SMF	nd	nd	nd	nd	nd	nd	nd	0.0581
Mean	nd	nd	nd	nd	nd	nc	nd	0.0252
Grand Mean	nd	nd	nd	nd	nd	nc	nd	0.0261
Dennys River @ Dead Stream - Brook Trout								
DS01BTF	nd	nd	0.0038	nd	nd	0.0056	nd	0.0110
DS02BTF	nd	nd	nd	nd	nd	0.0119	nd	0.0170
DS03BTF	nd	nd	nd	nd	nd	0.0017	nd	0.0114
DS04BTF	nd	nd	nd	nd	nd	0.0046	nd	0.0434
DS05BTF	nd	nd	0.0035	nd	0.0045	0.0110	nd	0.0522
Mean	nd	nd	nc	nd	nc	0.0070	nd	0.0270

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

* Based on congener-specific analyses

Table B-3. Organochlorines in **FILLET** samples of Smallmouth Bass from the East Machias River, ug/g WW.

Sample No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	p,p' DDT	Total PCBs*
East Machias River (Riverine Reference Site)								
EM01SMF	nd	nd	nd	nd	nd	nd	nd	0.0034
EM02SMF	nd	nd	nd	nd	nd	nd	nd	0.0034
EM03SMF	nd	nd	nd	nd	nd	0.0011	nd	0.0042
EM04SMF	nd	nd	nd	nd	nd	nd	nd	0.0117
EM05SMF	nd	nd	nd	nd	nd	0.0014	nd	0.0071
EM06SMF	nd	nd	nd	nd	nd	nd	nd	0.0063
Mean	nd	nd	nd	nd	nd	nc	nd	0.0060

nd = non-detect, nc = not calculated

* Based on congener-specific analyses

Table B-4. Organochlorines in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from Meddybemps Lake, *u* g/g WW.

Fish No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	p,p' DDT	Total PCBs*
Meddybemps Lake @ Eastern Surplus Site								
MS01SM	nd	nd	nd	0.0013	nd	0.0056	0.0009	0.1319
MS02SM	nd	nd	nd	nd	nd	0.0034	0.0004	0.0500
MS03SM	nd	0.0008	0.0008	0.0009	nd	0.0058	0.0009	0.0707
MS04SM	nd	0.0009	nd	0.0009	nd	0.0057	0.0011	0.0831
MS05SM	nd	nd	nd	nd	nd	0.0043	0.0005	0.0824
Mean	nd	nc	nc	nc	nd	0.0050	0.0008	0.0836
Meddybemps Lake @ Staple Cove (Lake Reference Site)								
SC01SM	nd	nd	nd	nd	nd	0.0056	0.0009	0.0177
SC02SM	nd	0.0009	nd	nd	0.0010	0.0081	0.0012	0.0282
SC03SM	nd	nd	nd	nd	nd	0.0025	0.0005	0.0118
SC04SM	nd	nd	nd	nd	nd	0.0046	0.0005	0.0169
SC05SM	nd	nd	nd	nd	nd	0.0058	0.0009	0.0213
Mean	nd	nc	nd	nd	nc	0.0053	0.0008	0.0192
Meddybemps Lake @ Fowler Point								
FP01SM	nd	nd	nd	nd	nd	0.0051	nd	0.0196
FP02SM	nd	nd	nd	nd	nd	0.0033	nd	0.0141
FP03SM	nd	0.0009	nd	nd	nd	0.0079	nd	0.0314
FP04SM	nd	0.0009	nd	nd	nd	0.0062	0.0009	0.0233
FP05SM	nd	0.0010	nd	nd	nd	0.0072	nd	0.0415
Mean	nd	nc	nd	nd	nd	0.0059	nc	0.0260
Grand Mean	nd	nc	nc	nc	nc	0.0054	nc	0.0429

nd = non-detect, nc = not calculated

Shaded cells represent a non-detect in fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

If both fillet and carcass samples were non-detects, one-half the sample detection limit of the carcass was used in the computation of the mean.
Those cells are shaded and bordered with a line.

* Based on congener-specific analyses

Table B-5. Organochlorines in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass and Brook Trout from the Dennys River, *u* g/g WW.

Fish No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	p,p' DDT	Total PCBs*
Denny River @ Eastern Surplus Site								
ES01SM	nd	nd	nd	nd	nd	0.0062	nd	0.0780
ES02SM	0.00100	0.0018	nd	0.0026	nd	0.0085	0.0012	0.2423
ES03SM	nd	nd	nd	nd	nd	0.0047	nd	0.0398
ES04SM	nd	0.0012	nd	nd	nd	0.0058	0.0009	0.0440
ES05SM	nd	nd	nd	nd	nd	0.0027	nd	0.0508
Mean	nc	nc	nd	nc	nd	0.0056	nc	0.0910
Dennys River @ Deadwater								
DW01SM	0.00130	0.0018	0.0012	nd	0.0012	0.0130	0.0013	0.2168
DW02SM	0.00118	0.0016	0.0010	nd	0.0012	0.0119	0.0014	0.2636
DW03SM	nd	nd	nd	0.0011	nd	0.0046	nd	0.0771
DW04SM	nd	0.0010	nd	nd	nd	0.0045	nd	0.0332
DW05SM	nd	nd	nd	0.0022	nd	0.0058	nd	0.2514
Mean	nc	nc	nc	nc	nc	0.0080	nc	0.1684
Grand Mean	nc	nc	nc	nc	nc	0.0068	nc	0.1297
Dennys River @ Dead Stream - Brook Trout								
DS01BT	nd	nd	0.0046	nd	nd	0.0064	nd	0.0154
DS02BT	nd	nd	0.0044	nd	0.0036	0.0160	nd	0.0259
DS03BT	nd	nd	0.0032	nd	nd	0.0043	nd	0.0111
DS04BT	nd	nd	0.0032	nd	nd	0.0060	nd	0.0572
DS05BT	nd	nd	0.0042	nd	0.0056	0.0131	nd	0.0501
Mean	nd	nd	0.0039	nd	nc	0.0092	nd	0.0319

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

* Based on congener-specific analyses

Table B-6. Organochlorines in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from the East Machias River, *u* g/g WW.

Fish No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	p,p' DDT	Total PCBs*
East Machias River (Riverine Reference Site)								
EM01SM	nd	nd	nd	nd	nd	0.0029	nd	0.0136
EM02SM	nd	nd	nd	nd	nd	0.0031	nd	0.0142
EM03SM	nd	0.0012	0.0008	nd	0.0010	0.0094	0.0008	0.0385
EM04SM	nd	nd	nd	nd	nd	0.0044	nd	0.0269
EM05SM	nd	0.0011	0.0009	nd	0.0009	0.0063	nd	0.0185
EM06SM	nd	0.0012	nd	nd	nd	0.0075	nd	0.0258
Mean	nd	nc	nc	nd	nc	0.0056	nc	0.0229

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

* Based on congener-specific analyses

Table B-7. Organochlorines in **WHOLEBODY** Pumpkinseed from Meddybemps Lake, *u* g/g WW.

Sample No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	Total PCBs*
Meddybemps Lake @ Eastern Surplus Site							
MS06PSW	nd	nd	nd	nd	nd	0.0027	0.0178
MS07PSW	nd	nd	nd	nd	nd	0.0017	0.0138
MS08PSW	nd	nd	nd	nd	nd	0.0018	0.0129
MS09PSW	nd	nd	nd	nd	nd	0.0018	0.0122
MS10PSW	nd	nd	nd	nd	nd	0.0014	0.0071
Mean	nd	nd	nd	nd	nd	0.0019	0.0128
Meddybemps Lake @ Staple Cove (Lake Reference Site)							
SC06PSW	nd	nd	nd	nd	nd	0.0027	0.0164
SC07PSW	nd	nd	nd	nd	nd	0.0017	0.0040
SC08PSW	nd	nd	nd	nd	nd	0.0024	0.0083
SC09PSW	nd	nd	nd	nd	nd	0.0027	0.0040
SC10PSW	nd	nd	nd	nd	nd	0.0032	0.0047
Mean	nd	nd	nd	nd	nd	0.0025	0.0075
Meddybemps Lake @ Fowler Point							
FP06PSW	nd	nd	nd	nd	nd	0.0014	0.0071
FP07PSW	nd	nd	nd	nd	nd	0.0032	0.0079
FP08PSW	nd	nd	nd	nd	nd	0.0009	0.0062
FP09PSW	nd	nd	nd	nd	nd	0.0015	0.0058
FP10PSW	nd	nd	nd	nd	nd	0.0022	0.0053
Mean	nd	nd	nd	nd	nd	0.0018	0.0064
Grand Mean	nd	nd	nd	nd	nd	0.0021	0.0089

nd = non-detect, nc = not calculated

* Based on congener-specific analyses

Table B-8. Organochlorines in **WHOLEBODY** White Sucker from the Dennys River, *u* g/g WW.

Sample No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	Total PCBs*
Dennys River @ Eastern Surplus Site							
ES06WSW	nd	nd	nd	nd	nd	0.0017	0.0386
ES07WSW	nd	nd	nd	nd	nd	0.0012	0.0318
ES08WSW	nd	nd	nd	nd	nd	0.0010	0.0458
ES09WSW	nd	nd	nd	nd	nd	0.0011	0.0836
ES10WSW	nd	nd	nd	nd	nd	0.0010	0.0702
Mean	nd	nd	nd	nd	nd	0.0012	0.0540
Dennys River @ Deadwater							
DW06WSW	nd	nd	nd	nd	nd	0.0010	0.0318
DW07WSW	nd	nd	nd	nd	nd	0.0004	0.0382
DW08WSW	nd	nd	nd	nd	nd	0.0015	0.0923
DW09WSW	nd	nd	nd	nd	nd	0.0010	0.0814
DW10WSW	nd	nd	nd	nd	nd	0.0010	0.0160
Mean	nd	nd	nd	nd	nd	0.0010	0.0519
Dennys River @ Dead Stream							
DS06WSW	nd	nd	nd	nd	0.0016	0.0039	0.0327
DS07WSW	nd	nd	nd	nd	0.0005	0.0021	0.0358
DS08WSW	nd	nd	nd	nd	0.0005	0.0010	0.0426
DS09WSW	nd	nd	nd	nd	0.0017	0.0053	0.0349
DS10WSW	nd	nd	0.0025	nd	0.0028	0.0078	0.0142
Mean	nd	nd	nc	nd	0.0014	0.0040	0.0320
Grand Mean	nd	nd	nc	nd	nc	0.0021	0.0460

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the detection limit.

* Based on congener-specific analyses

Table B-9. Organochlorines in **WHOLEBODY** White Sucker from the East Machias River, *u* g/g WW.

Sample No.	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	Total PCBs*
East Machias River (Riverine Reference Site)							
EM06WSW	nd	nd	nd	nd	nd	0.0037	0.0170
EM07WSW	nd	nd	nd	nd	nd	nd	0.0056
EM08WSW	nd	nd	nd	nd	nd	nd	0.0088
EM09WSW	nd	nd	nd	nd	nd	0.0010	0.0045
EM10WSW	nd	nd	nd	nd	nd	nd	0.0230
Mean	nd	nd	nd	nd	nd	nc	0.0118

nd = non-detect, nc = not calculated

* Based on congener-specific analyses

Table B10. Organochlorines in Freshwater **Mussel Composite** Samples from Meddybemps Lake, the Dennys River, and East Machias River, ug/g WW.

Sample No.	Location	*Cis* - nonachlor	*Trans* - nonachlor	Dieldrin	Endosulfan II	p,p' DDD	p,p' DDE	p,p' DDT	Total PCBs*
MS01AF	Meddybemps Lake	nd	nd	nd	nd	nd	nd	nd	0.004
SC01EC	Meddybemps Lake	nd	nd	nd	nd	nd	nd	nd	0.001
FP01EC	Meddybemps Lake	nd	nd	nd	nd	nd	nd	nd	0.004
Mean		nd	nd	nd	nd	nd	nd	nd	0.003
ES01AF	Dennys River	nd	nd	nd	nd	nd	nd	nd	0.005
ES02AF	Dennys River	nd	nd	nd	nd	nd	nd	nd	0.010
Mean		nd	nd	nd	nd	nd	nd	nd	0.007
EM01EC	E. Machias River	nd	nd	nd	nd	nd	nd	nd	0.002

nd = non -detect

* Based on congener-specific analyses

Appendix C. PCB homologs, Tables C-1 through C-10.

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Table C-1. PCB homologs in fillet samples of smallmouth bass from Meddybemps Lake.

Table C-2. PCB homologs in fillet samples of smallmouth bass and brook trout from the Dennys River.

Table C-3. PCB homologs in fillet samples of smallmouth bass from the East Machias River.

Table C-4. PCB homologs in reconstructed wholebody smallmouth bass from Meddybemps Lake.

Table C-5. PCB homologs in reconstructed smallmouth bass and brook trout from the Dennys River.

Table C-6. PCB homologs in reconstructed smallmouth bass from the East Machias River.

Table C-7. PCB homologs in wholebody samples of pumpkinseed from Meddybemps Lake.

Table C-8. PCB homologs in wholebody samples of white sucker from the Dennys River.

Table C-9. PCB homologs in wholebody samples of white sucker from the East Machias River.

Table C-10. PCB homologs in freshwater mussel composite samples from Meddybemps Lake, the Dennys River, and East Machias River.

Table C-1. PCB Homologs in **FILLET** samples of Smallmouth Bass from Meddybemps Lake, *u* g/g WW.

Sample No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
Meddybemps Lake @ Eastern Surplus Site											
MS01SMF	nd	nd	nd	nd	0.0019	0.0184	0.0144	0.0022	nd	nd	0.0370
MS02SMF	nd	nd	nd	nd	nd	0.0051	0.0061	0.0010	nd	nd	0.0122
MS03SMF	nd	nd	nd	nd	nd	0.0060	0.0064	0.0010	nd	nd	0.0134
MS04SMF	nd	nd	nd	nd	nd	0.0041	0.0082	0.0005	nd	nd	0.0128
MS05SMF	nd	nd	nd	nd	nd	0.0023	0.0033	0.0005	nd	nd	0.0060
Mean	nd	nd	nd	nd	nc	0.0072	0.0077	0.0010	nd	nd	0.0163
% of SUM						44%	47%	6%			
Meddybemps Lake @ Staples Cove											
SC01SMF	nd	nd	nd	nd	nd	0.0023	0.0022	nd	nd	nd	0.0045
SC02SMF	nd	nd	nd	nd	nd	0.0013	0.0033	nd	nd	nd	0.0046
SC03SMF	nd	nd	nd	nd	nd	0.0014	0.0034	nd	nd	nd	0.0049
SC04SMF	nd	nd	nd	nd	nd	0.0005	0.0029	nd	nd	nd	0.0034
SC05SMF	nd	nd	nd	nd	nd	0.0012	0.0036	nd	nd	nd	0.0047
Mean	nd	nd	nd	nd	nd	0.0013	0.0031	nd	nd	nd	0.0044
% of SUM						30%	70%				
Meddybemps Lake @ Fowler Point											
FP01SMF	nd	nd	nd	nd	nd	0.0010	0.0021	nd	nd	nd	0.0031
FP02SMF	nd	nd	nd	nd	nd	0.0033	0.0053	nd	nd	nd	0.0086
FP03SMF	nd	nd	nd	nd	0.0019	0.0041	0.0035	0.0010	nd	nd	0.0104
FP04SMF	nd	nd	nd	nd	nd	0.0011	0.0018	nd	nd	nd	0.0029
FP05SMF	nd	nd	nd	nd	nd	0.0011	0.0039	nd	nd	nd	0.0050
Mean	nd	nd	nd	nd	nc	0.0021	0.0033	nc	nd	nd	0.0060
% of SUM						36%	55%				

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the detection limit.

Table C-2. PCB Homologs in **FILLET** samples of Smallmouth Bass and Brook Trout from the Dennys River, *u* g/g WW.

Sample No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
Dennys River @ Eastern Surplus Site											
ES01SMF	nd	nd	nd	nd	0.0012	0.0047	0.0074	0.0012	nd	nd	0.0145
ES02SMF	nd	nd	nd	nd	0.0037	0.0252	0.0297	0.0050	nd	nd	0.0635
ES03SMF	nd	0.0033	nd	nd	0.0014	0.0085	0.0077	0.0013	nd	nd	0.0222
ES04SMF	nd	nd	nd	nd	0.0011	0.0048	0.0062	0.0005	nd	nd	0.0125
ES05SMF	nd	nd	nd	0.0010	0.0013	0.0068	0.0085	0.0016	nd	nd	0.0192
Mean	nd	nc	nd	nc	0.0017	0.0100	0.0119	0.0019	nd	nd	0.0264
% of SUM					7%	38%	45%	7%			
Dennys River @ Deadwater											
DW01SMF	nd	nd	nd	nd	0.0014	0.0098	0.0087	0.0018	nd	nd	0.0218
DW02SMF	nd	nd	nd	0.0011	0.0014	0.0098	0.0098	0.0017	nd	nd	0.0238
DW03SMF	nd	nd	nd	nd	nd	0.0051	0.0056	0.0011	nd	nd	0.0118
DW04SMF	nd	nd	nd	nd	nd	0.0029	0.0044	0.0012	nd	nd	0.0085
DW05SMF	nd	nd	nd	nd	nd	0.0250	0.0260	0.0041	nd	nd	0.0551
Mean	nd	nd	nd	nc	nc	0.0105	0.0109	0.0020	nd	nd	0.0242
% of SUM						44%	45%	8%			
Dennys River @ Dead Stream - Brook Trout											
DS01BTF	nd	nd	nd	nd	nd	0.0041	0.00185	nd	nd	nd	0.0059
DS02BTF	nd	nd	nd	nd	nd	0.0062	0.00692	nd	nd	nd	0.0131
DS03BTF	nd	nd	nd	nd	nd	0.0042	0.00170	nd	nd	nd	0.0059
DS04BTF	nd	nd	nd	nd	nd	0.0181	0.01730	nd	nd	nd	0.0354
DS05BTF	nd	nd	nd	0.0030	nd	0.0113	0.00839	nd	0.0251	nd	0.0478
Mean	nd	nd	nd	nc	nd	0.0088	0.00723	nd	nc	nd	0.0216
% of SUM						41%	33%				

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the detection limit.

Table C-3. PCB Homologs in **FILLET** samples of Smallmouth Bass from the East Machias River, *u* g/g WW.

Sample No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
EM01SMF	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
EM02SMF	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
EM03SMF	nd	nd	nd	nd	nd	0.0014	0.0016	nd	nd	nd	0.0030
EM04SMF	nd	nd	nd	0.0029	nd	nd	0.0031	nd	nd	nd	0.0061
EM05SMF	0.0010	nd	nd	0.0025	nd	0.0011	0.0019	nd	nd	nd	0.0065
EM06SMF	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mean	nc	nd	nd	nc	nd	nc	nc	nd	nd	nd	nc

nd = non-detect, nc = not calculated

Table C-4. PCB Homologs in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from Meddybemps Lake, *u* g/g WW.

Fish No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
Meddybemps Lake @ Eastern Surplus Site											
MS01SM	nd	nd	nd	0.0014	0.0079	0.0618	0.0520	0.0083	nd	nd	0.1315
MS02SM	nd	nd	nd	0.0070	0.0025	0.0174	0.0192	0.0036	nd	nd	0.0496
MS03SM	nd	nd	nd	0.0012	0.0050	0.0298	0.0290	0.0050	nd	nd	0.0699
MS04SM	nd	nd	nd	0.0013	0.0061	0.0354	0.0346	0.0054	nd	nd	0.0828
MS05SM	nd	nd	nd	0.0009	0.0036	0.0200	0.0536	0.0033	nd	nd	0.0815
Mean	nd	nd	nd	0.0024	0.0050	0.0329	0.0377	0.0051	nd	nd	0.0831
% of SUM				3%	6%	40%	45%	6%			
Meddybemps Lake @ Staples Cove (Lake Reference Site)											
SC01SM	nd	nd	nd	0.0008	0.0020	0.0067	0.0061	0.0015	nd	nd	0.0171
SC02SM	nd	nd	nd	0.0010	0.0032	0.0109	0.0100	0.0025	nd	nd	0.0276
SC03SM	nd	nd	nd	nd	0.0009	0.0041	0.0050	0.0010	nd	nd	0.0110
SC04SM	nd	nd	nd	nd	0.0018	0.0063	0.0064	0.0015	nd	nd	0.0160
SC05SM	nd	nd	nd	nd	0.0024	0.0081	0.0076	0.0018	nd	nd	0.0198
Mean	nd	nd	nd	nc	0.0021	0.0072	0.0070	0.0016	nd	nd	0.0183
% of SUM					11%	39%	38%	9%			
Meddybemps Lake @ Fowler Point											
FP01SM	nd	nd	nd	0.0012	0.0028	0.0068	0.0058	0.0017	nd	nd	0.0182
FP02SM	nd	nd	nd	0.0012	0.0016	0.0043	0.0045	0.0013	nd	nd	0.0129
FP03SM	0.0010	nd	nd	0.0016	0.0050	0.0108	0.0090	0.0025	nd	nd	0.0300
FP04SM	nd	nd	nd	0.0014	0.0037	0.0080	0.0069	0.0019	nd	nd	0.0219
FP05SM	nd	nd	nd	0.0017	0.0057	0.0150	0.0138	0.0037	0.0010	nd	0.0409
Mean	nc	nd	nd	0.0014	0.0038	0.0090	0.0080	0.0022	nc	nd	0.0248
% of SUM				6%	15%	36%	32%	9%			

Table C-5. PCB Homologs in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass and Brook Trout from the Dennys River, *u* g/g WW.

Fish No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
Dennys River @ Eastern Surplus Site											
ES01SM	nd	nd	nd	nd	0.0073	0.0346	0.0301	0.0059	nd	nd	0.0780
ES02SM	nd	nd	nd	nd	0.0176	0.1033	0.1082	0.0180	0.0013	nd	0.2484
ES03SM	nd	0.0011	nd	nd	0.0037	0.0169	0.0152	0.0030	nd	nd	0.0399
ES04SM	nd	0.0010	nd	0.0051	0.0038	0.0165	0.0153	0.0028	nd	nd	0.0445
ES05SM	nd	nd	nd	0.0017	0.0046	0.0211	0.0189	0.0038	nd	nd	0.0500
Mean	nd	nc	nd	nc	0.0074	0.0385	0.0375	0.0067	nc	nd	0.0921
% of SUM					8%	42%	41%	7%			
Dennys River @ Deadwater											
DW01SM	nd	nd	nd	0.0025	0.0152	0.0999	0.0828	0.0157	0.0017	nd	0.2177
DW02SM	nd	nd	nd	0.0025	0.0159	0.1231	0.1044	0.0181	0.0016	nd	0.2656
DW03SM	nd	nd	nd	0.0012	0.0053	0.0342	0.0309	0.0055	nd	nd	0.0772
DW04SM	nd	nd	nd	nd	0.0031	0.0138	0.0131	0.0028	nd	nd	0.0328
DW05SM	nd	nd	nd	nd	0.0101	0.1129	0.1082	0.0188	0.0016	nd	0.2517
Mean	nd	nd	nd	nc	0.0099	0.0768	0.0679	0.0122	nc	nd	0.1690
% of SUM					6%	45%	40%	7%			
Dennys River @ Dead Stream - Brook Trout											
DS01BT	nd	nd	nd	nd	nd	0.0058	0.0041	nd	nd	nd	0.0098
DS02BT	nd	nd	nd	nd	nd	0.0090	0.0107	nd	nd	nd	0.0196
DS03BT	nd	nd	nd	nd	nd	0.0031	nd	nd	nd	nd	0.0031
DS04BT	nd	nd	nd	nd	0.0038	0.0232	0.0225	0.0035	nd	nd	0.0530
DS05BT	nd	nd	nd	0.0026	0.0033	0.0147	0.0132	nd	0.0135	nd	0.0472
Mean	nd	nd	nd	nc	nc	0.0111	nc	nc	nc	nd	0.0266
% of SUM						42%					

nd = non-detect, nc = not calculated

Shaded values represent a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

Table C-6. PCB Homologs in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from the East Machias River, *u* g/g WW.

Fish No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
EM01SM	0.0021	nd	nd	0.0014	0.0032	0.0043	0.0025	nd	nd	nd	0.0135
EM02SM	nd	nd	0.0013	nd	0.0031	0.0049	0.0037	0.0012	nd	nd	0.0141
EM03SM	0.0015	nd	nd	0.0033	0.0091	0.0148	0.0077	0.0018	nd	nd	0.0382
EM04SM	nd	nd	nd	0.0012	0.0050	0.0101	0.0010	0.0017	nd	nd	0.0190
EM05SM	0.0006	nd	nd	0.0020	0.0043	0.0069	0.0040	0.0010	nd	nd	0.0188
EM06SM	nd	nd	nd	0.0013	0.0056	0.0105	0.0061	0.0017	nd	nd	0.0252
Mean	nc	nd	nc	nc	0.0051	0.0086	0.0042	nc	nd	nd	0.0215
% of SUM					24%	40%	19%				

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

Table C-7. PCB Homologs in **WHOLEBODY** samples of Pumpkinseed from Meddybemps Lake, *u* g/g WW.

Sample No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
Meddybemps Lake @ Eastern Surplus Site											
MS06PSW	nd	nd	nd	0.0013	0.0023	0.0073	0.0059	nd	nd	nd	0.0168
MS07PSW	nd	nd	nd	0.0005	0.0012	0.0054	0.0054	nd	nd	nd	0.0124
MS08PSW	nd	nd	nd	0.0009	0.0013	0.0050	0.0049	nd	nd	nd	0.0121
MS09PSW	nd	nd	nd	0.0033	0.0012	0.0035	0.0035	nd	nd	nd	0.0115
MS10PSW	nd	nd	nd	0.0018	0.0005	0.0019	0.0025	nd	nd	nd	0.0067
Mean	nd	nd	nd	0.0016	0.0013	0.0046	0.0044	nd	nd	nd	0.0119
% of SUM				13%	11%	39%	37%				
Meddybemps Lake @ Staples Cove											
SC06PSW	nd	nd	nd	nd	0.0012	0.0055	0.0068	0.0019	nd	nd	0.0154
SC07PSW	nd	nd	nd	nd	nd	0.0014	0.0010	nd	nd	nd	0.0024
SC08PSW	nd	0.0025	nd	nd	nd	0.0020	0.0020	nd	nd	nd	0.0065
SC09PSW	nd	nd	nd	nd	nd	0.0015	0.0011	nd	nd	nd	0.0027
SC10PSW	nd	nd	nd	nd	nd	0.0017	0.0014	nd	nd	nd	0.0031
Mean	nd	nc	nd	nd	nc	0.0024	0.0025	nc	nd	nd	0.0060
% of SUM						40%	41%				
Meddybemps Lake @ Fowler Point											
FP06PSW	nd	nd	nd	nd	nd	0.0034	0.0020	nd	nd	nd	0.0054
FP07PSW	nd	nd	nd	nd	0.0010	0.0037	0.0018	nd	nd	nd	0.0066
FP08PSW	nd	nd	nd	nd	nd	0.0020	0.0026	nd	nd	nd	0.0046
FP09PSW	nd	nd	nd	nd	nd	0.0028	0.0017	nd	nd	nd	0.0045
FP10PSW	nd	nd	nd	nd	0.0012	0.0018	0.0013	nd	nd	nd	0.0043
Mean	nd	nd	nd	nd	nc	0.0027	0.0019	nd	nd	nd	0.0051
% of SUM						54%	37%				

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the detection limit.

Table C-8. PCB Homologs in **WHOLEBODY** samples of White Sucker from the Dennys River, *u* g/g WW.

Sample No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
Dennys River @ Eastern Surplus Site											
ES06WSW	nd	nd	nd	0.0020	0.0033	0.0162	0.0143	0.0027	nd	nd	0.0385
ES07WSW	nd	nd	nd	0.0012	0.0012	0.0126	0.0127	0.0027	nd	nd	0.0304
ES08WSW	nd	nd	nd	0.0010	0.0021	0.0171	0.0199	0.0043	nd	nd	0.0443
ES09WSW	nd	nd	nd	0.0011	0.0037	0.0338	0.0365	0.0073	nd	nd	0.0824
ES10WSW	nd	nd	nd	0.0010	0.0029	0.0274	0.0314	0.0065	nd	nd	0.0692
Mean	nd	nd	nd	0.0013	0.0026	0.0214	0.0230	0.0047	nd	nd	0.0530
% of SUM				2%	5%	40%	43%	9%			
Dennys River @ Deadwater											
DW06WSW	nd	nd	nd	nd	0.0020	0.0136	0.0110	0.0010	nd	nd	0.0276
DW07WSW	0.0033	nd	nd	nd	0.0011	0.0159	0.0151	0.0025	nd	nd	0.0379
DW08WSW	nd	nd	nd	nd	0.0039	0.0394	0.0404	0.0069	nd	nd	0.0906
DW09WSW	nd	nd	nd	nd	0.0030	0.0341	0.0372	0.0064	nd	nd	0.0807
DW10WSW	nd	nd	nd	nd	0.0011	0.0073	0.0061	0.0005	nd	nd	0.0150
Mean	nc	nd	nd	nd	0.0022	0.0221	0.0220	0.0034	nd	nd	0.0504
% of SUM					4%	44%	44%	7%			
Dennys River @ Dead Stream											
DS06WSW	nd	0.0022	nd	0.0025	0.0014	0.0111	0.0124	0.0023	nd	nd	0.0319
DS07WSW	nd	nd	nd	0.0021	0.0020	0.0149	0.0145	0.0024	nd	nd	0.0358
DS08WSW	nd	nd	nd	0.0019	0.0015	0.0177	0.0181	0.0034	nd	nd	0.0426
DS09WSW	nd	nd	nd	0.0020	0.0019	0.0126	0.0161	0.0020	nd	nd	0.0347
DS10WSW	nd	nd	nd	0.0010	0.0010	0.0063	0.0037	0.0010	nd	nd	0.0131
Mean	nd	nc	nd	0.00190	0.00154	0.01252	0.01296	0.00223	nd	nd	0.0316
% of SUM				6%	5%	40%	41%	7%			

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the detection limit.

Table C-9. PCB Homologs in **WHOLEBODY** samples of White Sucker from the East Machias River, *u* g/g WW.

Sample No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-	SUM
EM06WSW	nd	nd	nd	0.0036	0.0023	0.0025	0.0049	nd	nd	nd	0.0132
EM07WSW	nd	nd	nd	0.0040	nd	nd	nd	nd	nd	nd	0.0040
EM08WSW	nd	nd	nd	0.0056	nd	nd	nd	nd	nd	nd	0.0056
EM09WSW	nd	nd	nd	0.0018	nd	nd	0.00109	nd	nd	nd	0.0029
EM10WSW	nd	nd	nd	0.0056	0.0025	0.0061	0.0070	nd	nd	nd	0.0212
Mean	nd	nd	nd	0.0041	nc	nc	nc	nd	nd	nd	0.0094
% of SUM				44%							

nd = non-detect, nc = not calculated

Table C-10. PCB Homologs in Freshwater **MUSSEL COMPOSITE** Samples from Meddybemps Lake, the Dennys River, and East Machias River, *u* g/g WW.

Sample No.	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-
MS01AF	nd	nd	nd	nd	nd	0.0011	0.0015	nd	nd	nd
SC01EC	nd	nd	nd	nd	nd	nd	0.0005	nd	nd	nd
FP01EC	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ES01AF	nd	nd	nd	nd	nd	0.0017	0.0026	nd	nd	nd
ES02AF	nd	nd	nd	nd	nd	0.0039	0.0049	nd	nd	nd
EM01EC	nd	nd	nd	nd	nd	nd	0.0011	nd	nd	nd

Appendix D. Non-*ortho* and Mono-*ortho* Planar PCB congeners, Tables D-1 through D-10.

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Table D-1. Non-*ortho* and Mono-*ortho* Planar PCB congeners in fillet samples of smallmouth bass from Meddybemps Lake.

Table D-2. Non-*ortho* and Mono-*ortho* Planar PCB congeners in fillet samples of smallmouth bass and brook trout from the Dennys River.

Table D-3. Non-*ortho* and Mono-*ortho* Planar PCB congeners in fillet samples of smallmouth bass from the East Machias River.

Table D-4. Non-*ortho* and Mono-*ortho* Planar PCB congeners in reconstructed wholebody smallmouth bass from Meddybemps Lake.

Table D-5. Non-*ortho* and Mono-*ortho* Planar PCB congeners in reconstructed wholebody smallmouth bass and brook trout from the Dennys River.

Table D-6. Non-*ortho* and Mono-*ortho* Planar PCB congeners in reconstructed wholebody smallmouth bass from the East Machias River.

Table D-7. Non-*ortho* and Mono-*ortho* Planar PCB congeners in wholebody samples of pumpkinseed from Meddybemps Lake.

Table D-8. Non-*ortho* and Mono-*ortho* Planar PCB congeners in wholebody samples of white sucker from the Dennys River.

Table D-9. Non-*ortho* and Mono-*ortho* Planar PCB congeners in wholebody samples of white sucker from the East Machias River.

Table D-10. Non-*ortho* and Mono-*ortho* Planar PCB congeners in freshwater mussel composite samples from Meddybemps Lake, the Dennys River, and East Machias River.

Table D-1. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **FILLET** Samples of Smallmouth Bass from Meddybemps Lake, *u* g/g WW.

Sample No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
Meddybemps Lake @ Eastern Surplus Site											
MS01SMF	0.000012	0.000014	nd	nd	nd	nd	nd	0.000879	0.000346	0.000076	nd
MS02SMF	0.0000050	0.000014	nd	nd	nd	nd	nd	0.000077	0.00015	nd	nd
MS03SMF	0.000023	0.000013	nd	nd	nd	nd	nd	0.000319	0.00016	nd	nd
MS04SMF	0.0000049	0.0000049	nd	nd	0.000011	nd	nd	0.000049	0.000128	nd	nd
MS05SMF	0.000012	0.00001	nd	nd	nd	nd	nd	0.000027	0.000071	nd	nd
Mean	0.0000114	0.0000112	nd	nd	nc	nd	nd	0.000270	0.000171	nc	nd
Meddybemps Lake @ Staples Cove (Lake Reference Site)											
SC01SMF	0.000046	0.000017	0.000028	nd	nd	nd	nd	0.000114	0.000204	nd	nd
SC02SMF	nd	0.0000049	0.000024	nd	nd	nd	nd	0.000035	0.000104	nd	nd
SC03SMF	0.000038	0.000011	0.000022	nd	nd	nd	nd	0.0001	0.000098	nd	nd
SC04SMF	nd	0.0000048	0.000067	nd	nd	nd	nd	0.0000048	0.000047	nd	nd
SC05SMF	nd	0.000015	0.000012	nd	nd	nd	nd	0.000089	0.000088	nd	nd
Mean	nc	0.0000106	0.000031	nd	nd	nd	nd	0.0000686	0.000108	nd	nd
Meddybemps Lake @ Fowler Point											
FP01SMF	nd	nd	nd	nd	nd	nd	nd	0.000024	0.000093	0.0000048	nd
FP02SMF	nd	nd	nd	nd	0.000031	nd	nd	0.000065	0.000267	0.000032	nd
FP03SMF	nd	0.000015	nd	nd	nd	0.000102	nd	0.000104	0.000367	0.000074	nd
FP04SMF	nd	0.000012	nd	nd	nd	nd	nd	0.000027	0.000092	0.000025	nd
FP05SMF	nd	nd	nd	nd	0.000037	nd	nd	0.000036	0.000132	0.0000111	nd
Mean	nd	nc	nd	nd	nc	nc	nd	0.000051	0.000190	0.0000294	nd

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

Table D-2. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **FILLET** Samples of Smallmouth Bass and Brook Trout from the Dennys River, *u* g/g WW.

Sample No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
Dennys River @ Eastern Surplus Site											
ES01SMF	nd	0.000047	nd	nd	nd	nd	nd	0.000012	0.000274	0.000012	nd
ES02SMF	0.000019	0.000036	nd	nd	nd	nd	nd	0.000426	0.000382	0.000151	0.000094
ES03SMF	nd	0.0000049	nd	nd	nd	nd	nd	0.000259	0.000347	0.000015	nd
ES04SMF	nd	0.0000048	0.000106	nd	0.000012	nd	nd	0.000071	0.000215	0.000033	nd
ES05SMF	nd	0.000011	0.000011	nd	nd	nd	nd	0.000117	0.000255	0.00005	0.00003
Mean	nc	0.0000208	nc	nd	nc	nd	nd	0.000177	0.000295	0.000052	nc
Dennys River @ Deadwater											
DW01SMF	nd	0.00002	nd	nd	nd	nd	nd	0.000092	0.000278	0.000068	nd
DW02SMF	0.00001	nd	nd	nd	0.000058	nd	nd	0.000093	0.000303	0.000034	nd
DW03SMF	nd	nd	nd	nd	nd	nd	nd	0.000122	0.000119	0.000058	nd
DW04SMF	nd	nd	nd	nd	0.000026	nd	nd	0.00007	0.000127	0.0000115	nd
DW05SMF	nd	nd	0.000026	nd	nd	nd	nd	0.000522	0.000475	0.000209	0.000093
Mean	nc	nc	nc	nd	nc	nd	nd	0.000180	0.000260	0.000076	nc
Dennys River @ Dead Stream - Brook Trout											
DS01BTF	nd	nd	nd	nd	nd	nd	nd	0.0000185	0.000291	nd	nd
DS02BTF	nd	nd	nd	nd	nd	nd	nd	0.000075	0.000291	nd	nd
DS03BTF	nd	nd	nd	nd	nd	nd	nd	0.000046	0.00037	nd	nd
DS04BTF	nd	nd	nd	nd	nd	nd	nd	0.000297	0.000555	0.000164	0.000075
DS05BTF	nd	0.000038	nd	nd	nd	nd	nd	0.000081	0.000582	nd	nd
Mean	nd	nc	nd	nd	nd	nd	nd	0.000104	0.000418	nc	nc

nd = non-detect, nc = not calculated

Shaded cells indicate non-detect. Values listed are one-half the detection limit.

Table D-3. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **FILLET** Samples of Smallmouth Bass from the East Machias River, *u* g/g WW.

Sample No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
EM01SMF	nd	nd	nd	nd	0.000026	0.000041	nd	nd	0.000064	nd	nd
EM02SMF	nd	nd	nd	nd	nd	0.000039	nd	nd	0.000181	nd	nd
EM03SMF	0.00001	0.000011	nd	nd	nd	0.000047	nd	0.000064	0.000201	nd	nd
EM04SMF	nd	0.000028	nd	nd	nd	0.000225	nd	nd	0.000321	nd	nd
EM05SMF	0.000018	0.000032	nd	nd	nd	0.0000048	nd	nd	0.000263	nd	nd
EM06SMF	nd	nd	nd	nd	nd	0.0000115	nd	nd	0.000159	nd	nd
Mean	nc	nc	nd	nd	nc	0.0000614	nd	nc	0.000198	nd	nd

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

Table D-4. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from Meddybemps Lake, *u* g/g WW.

Fish No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
Meddybemps Lake @ Eastern Surplus Site											
MS01SM	0.0000256	0.0000185	nd	nd	nd	nd	nd	0.003369486	0.001416054	0.000310595	0.000132128
MS02SM	nd	0.0000208	nd	nd	nd	nd	nd	0.000262768	0.000625747	0.000121286	0.0000533
MS03SM	0.0000289	0.0000189	nd	nd	0.0000108	nd	nd	0.000471756	0.001038163	0.000185005	0.0000736
MS04SM	0.0000205	0.0000168	0.0000109	nd	0.0000063	nd	nd	0.000454122	0.001216211	0.000232132	0.0000826
MS05SM	0.0000250	0.0000165	nd	nd	nd	nd	nd	0.000301614	0.000947013	0.00026655	0.0000521
Mean	nc	0.0000183	nc	nd	nc	nd	nd	0.000971949	0.001048638	0.000223114	0.0000787
Meddybemps Lake @ Staples Cove (Lake Reference Site)											
SC01SM	0.0000361	0.0000149	0.0000188	nd	nd	0.0000838	nd	0.000268793	0.000641396	0.0000795	0.0000291
SC02SM	0.0000210	0.0000108	0.0000138	nd	nd	0.000157541	nd	0.000412398	0.000955153	0.000152431	0.0000437
SC03SM	0.0000305	0.0000064	0.0000265	nd	nd	nd	nd	0.00017309	0.000318017	0.0000587	0.0000303
SC04SM	nd	0.0000092	0.0000231	nd	nd	0.000105245	nd	0.0002917	0.00054704	0.000120077	0.0000268
SC05SM	nd	0.0000077	0.0000113	nd	nd	0.0000964	nd	0.000318787	0.00072417	0.0001191	0.0000390
Mean	nc	0.0000098	0.0000187	nd	nd	nc	nd	0.000292954	0.000637155	0.0001060	0.0000338
Meddybemps Lake @ Fowler Point											
FP01SM	0.0000145	0.0000104	0.0000644	nd	0.0000179	nd	nd	0.000164868	0.000617493	0.0000925	0.0000159
FP02SM	nd	nd	0.0000134	nd	0.0000109	nd	nd	0.000104765	0.000364118	0.0000526	nd
FP03SM	nd	0.0000157	nd	nd	0.0000180	0.000251364	0.0000222	0.00027539	0.000988545	0.000158662	0.0000228
FP04SM	0.0000091	0.0000072	nd	nd	nd	0.000185527	nd	0.000191879	0.000771956	0.000119022	0.0000186
FP05SM	nd	0.0000170	nd	nd	0.0000281	nd	0.0000325	0.000355318	0.001264058	0.000291077	0.0000696
Mean	nc	nc	nc	nd	nc	nc	nc	0.000218444	0.000801234	0.0001428	nc

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

Table D-5. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass and Brook Trout from the Dennys River, *u* g/g WW.

Fish No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
Dennys River @ Eastern Surplus Site											
ES01SM	nd	0.0000250	nd	nd	nd	nd	nd	0.0007427	0.0016201	0.0003205	0.0001075
ES02SM	0.0000168	0.0000294	nd	nd	nd	nd	nd	0.0015919	0.0017995	0.0006601	0.0003251
ES03SM	0.0000120	0.0000182	nd	nd	nd	nd	nd	0.0004212	0.0007471	0.0001296	0.0000518
ES04SM	0.0000103	0.0000126	0.0000288	nd	0.0000064	nd	nd	0.0004093	0.0007940	0.0001427	0.0000507
ES05SM	nd	0.0000124	0.0000063	nd	0.0000259	nd	nd	0.0003248	0.0008089	0.0001890	0.0000742
Mean	nc	0.0000195	nc	nd	nc	nd	nd	0.0006980	0.0011539	0.0002884	0.0001218
Dennys River @ Deadwater											
DW01SM	0.0000495	0.0001740	nd	0.0000424	0.0000344	nd	nd	0.0009625	0.0030389	0.0005976	0.0002560
DW02SM	0.0000100	0.0000466	nd	0.0000432	0.0000124	nd	nd	0.0017232	0.0034469	0.0007534	0.0003383
DW03SM	0.0000168	0.0000212	nd	nd	nd	nd	nd	0.0007869	0.0010526	0.0003364	0.0001345
DW04SM	0.0000200	0.0000259	nd	nd	0.0000102	nd	nd	0.0003959	0.0006989	0.0001304	0.0000422
DW05SM	0.0000660	0.0001745	0.0000107	nd	0.0000178	nd	nd	0.0024770	0.0021160	0.0011383	0.0005445
Mean	0.0000325	0.0000885	nc	nc	nc	nd	nd	0.0012691	0.0020707	0.0005912	0.0002631
Dennys River @ Dead Stream - Brook Trout											
DS01BT	nd	nd	nd	nd	nd	nd	nd	nd	0.0003860	nd	nd
DS02BT	nd	0.0000358	nd	nd	nd	nd	nd	0.0001111	0.0004425	nd	nd
DS03BT	nd	0.0000293	nd	nd	nd	nd	nd	0.0000333	0.0003257	nd	nd
DS04BT	0.0000387	nd	nd	nd	nd	nd	nd	0.000287291	0.000690437	0.000142155	0.0000735
DS05BT	nd	0.0000526	nd	nd	nd	nd	nd	0.000133536	0.000705763	nd	nd
Mean	nc	nc	nd	nd	nd	nd	nd	nc	0.0005101	nc	nc

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

Table D-6. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from the East Machias River, *u* g/g WW.

Fish No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
EM01SM	0.0000217	0.0000217	0.0000223	nd	0.0000113	0.0001361	nd	0.0002264	0.0005872	0.0000492	nd
EM02SM	0.0000237	0.0000164	0.0000322	nd	nd	0.0001494	nd	0.0001886	0.0006988	0.0001012	nd
EM03SM	0.0000312	0.0000185	nd	nd	nd	0.0005336	nd	0.0003645	0.0020757	0.0002192	0.0000227
EM04SM	0.0000178	0.0000183	nd	nd	0.0000602	0.0003000	nd	0.0003943	0.0015014	0.0002005	0.0000213
EM05SM	0.0000194	0.0000245	nd	nd	nd	0.0001728	nd	0.0001584	0.0011205	0.0001618	nd
EM06SM	nd	0.0000177	nd	nd	nd	0.0001456	nd	0.0003660	0.0016371	0.0001860	nd
Mean	nc	0.0000195	nc	nd	nc	0.0002396	nd	0.0002830	0.0012701	0.0001530	nc

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

Table D-7. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **WHOLEBODY** Pumpkinseed from Meddybemps Lake, *u* g/g WW.

Sample No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
Meddybemps Lake @ Eastern Surplus Site											
MS06PSW	0.000015	0.0000048	nd	nd	nd	nd	nd	0.000087	0.000549	nd	nd
MS07PSW	0.000015	0.000015	nd	nd	nd	nd	nd	0.00009	0.000364	nd	nd
MS08PSW	0.0000046	0.00001	nd	nd	nd	nd	nd	0.000087	0.000368	nd	nd
MS09PSW	0.000012	0.000015	nd	nd	nd	nd	nd	0.000059	0.000279	nd	nd
MS10PSW	0.0000049	0.000016	nd	0.000154	0.00002	nd	nd	0.0000049	0.000137	nd	nd
Mean	0.0000103	0.0000122	nd	nc	nc	nd	nd	0.0000656	0.0003394	nd	nd
Meddybemps Lake @ Staples Cove (Lake Reference Site)											
SC06PSW	nd	0.0000047	0.000023	nd	nd	0.000062	nd	0.000121	0.000334	nd	nd
SC07PSW	nd	0.000011	0.0000049	nd	nd	0.0000049	nd	0.0000049	0.000226	nd	nd
SC08PSW	nd	0.000029	0.000011	nd	nd	0.000039	nd	0.0000049	0.000231	nd	nd
SC09PSW	nd	0.0000048	0.000011	nd	nd	0.000036	nd	0.000076	0.000219	nd	nd
SC10PSW	0.000037	0.000012	0.0000050	0.000018	nd	0.000046	nd	0.000132	0.000242	nd	nd
Mean	nc	0.0000123	0.0000110	nc	nd	0.0000376	nd	0.0000678	0.000250	nd	nd
Meddybemps Lake @ Fowler Point											
FP06PSW	0.0000047	0.0000047	nd	nd	nd	nd	nd	nd	0.000206	nd	nd
FP07PSW	0.000026	0.0000050	nd	nd	nd	nd	nd	nd	0.000296	nd	nd
FP08PSW	0.000013	0.000012	nd	nd	nd	0.000044	nd	nd	0.000184	nd	nd
FP09PSW	0.000013	0.000015	nd	nd	nd	nd	nd	nd	0.000149	nd	nd
FP10PSW	0.000021	0.00001	nd	nd	nd	0.000051	nd	nd	0.00025	nd	nd
Mean	0.0000155	0.0000093	nd	nd	nd	nc	nd	nd	0.000217	nd	nd

nd = non-detect, nc = not calculated

Shaded cells indicate non-detects. Values listed are one-half the sample detection limit.

Table D-8. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **WHOLEBODY** White Sucker from the Dennys River, *u* g/g WW.

Sample No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
Dennys River @ Eastern Surplus											
ES06WSW	nd	0.000015	nd	nd	nd	nd	nd	0.000311	0.000537	0.000145	0.000055
ES07WSW	0.000026	0.0000120	nd	nd	nd	nd	nd	0.000189	0.000342	0.000119	0.00005
ES08WSW	nd	0.0000097	nd	nd	nd	nd	nd	0.0000097	0.000452	0.000175	0.000085
ES09WSW	nd	0.000019	0.000012	nd	0.00002	nd	0.000039	0.000634	0.000867	0.000315	0.000169
ES10WSW	0.000041	0.000015	nd	nd	0.00003	nd	nd	0.0000048	0.000615	0.000285	0.000137
Mean	nc	0.000014	nc	nd	nc	nd	nc	0.0002297	0.000563	0.000208	0.000099
Dennys River @ Deadwater											
DW06WSW	0.000010	0.000010	nd	nd	nd	nd	nd	0.000285	0.000462	0.00013	0.00001
DW07WSW	0.00005	0.000022	0.000069	nd	0.000063	nd	nd	0.000462	0.000298	0.000141	0.00006
DW08WSW	0.000032	0.000061	nd	nd	nd	nd	nd	0.00108	0.000879	0.000393	0.000198
DW09WSW	0.000015	0.000027	nd	nd	nd	nd	nd	0.000852	0.00081	0.000359	0.000194
DW10WSW	0.0000046	0.000005	nd	nd	nd	nd	nd	0.000186	0.000288	0.0000046	0.000021
Mean	0.000022	0.000025	nc	nd	nc	nd	nd	0.000573	0.000547	0.0002055	0.000097
Dennys River @ Dead Stream											
DS06WSW	0.000024	0.000061	0.000011	nd	nd	nd	nd	0.000085	0.000371	0.00004	0.00001
DS07WSW	0.000018	0.000029	0.000012	nd	nd	nd	nd	0.000076	0.000463	nd	nd
DS08WSW	0.000015	0.000045	0.000012	0.000094	nd	nd	nd	0.00014	0.000383	0.00007	nd
DS09WSW	0.000018	0.000046	0.0000049	nd	nd	nd	nd	0.0001	0.000351	nd	nd
DS10WSW	0.0000105	0.0000105	0.0000105	nd	nd	nd	nd	0.0000105	0.000259	nd	nd
Mean	0.0000171	0.0000383	0.0000101	nc	nd	nd	nd	0.0000823	0.0003654	nc	nc

nd = non-detect, nc = not calculated

Shaded cells indicate non-detects. Values listed are one-half the sample detection limit.

Table D-9. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **WHOLEBODY** White Sucker from the East Machias River, *u* g/g WW.

Sample No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
EM06WSW	0.000025	nd	nd	nd	nd	0.000436	nd	nd	0.00066	nd	nd
EM07WSW	0.0000123	0.000055	nd	nd	nd	0.0000123	nd	nd	0.0000123	nd	nd
EM08WSW	0.0000123	nd	nd	nd	nd	0.0000123	nd	nd	0.0000123	nd	nd
EM09WSW	0.000012	nd	nd	nd	nd	0.000045	nd	nd	0.000263	nd	nd
EM10WSW	0.00003	0.000039	nd	nd	nd	0.000726	nd	0.00134	0.000721	nd	nd
Mean	0.0000183	nc	nd	nd	nd	0.00024632	nd	nc	0.00033372	nd	nd

nd = non-detect, nc = not calculated

Shaded cells indicate non-detects. Values listed are one-half the sample detection limit.

Table D-10. Non-*ortho* and Mono-*ortho* Planar PCB Congeners in **MUSSEL COMPOSITE** Samples from Meddybemps Lake, the Dennys River, and East Machias River, ug/g WW.

Sample No.	Non-*ortho* PCBs					Mono-*ortho* PCBs					
	PCB# 77	PCB# 126	PCB# 169	PCB# 15	PCB# 81	PCB# 105	PCB# 114	PCB# 156/ 171/202	PCB# 118/ 108/149	PCB# 167	PCB# 189
MS01AF	nd	nd	nd	nd	nd	nd	nd	0.000074	0.000022	nd	nd
SC01EC	nd	0.000012	0.000066	nd	nd	nd	nd	nd	nd	nd	nd
FP01EC	nd	nd	nd	nd	nd	nd	nd	nd	0.000034	nd	nd
ES01AF	nd	nd	nd	nd	nd	nd	nd	nd	0.000069	nd	nd
ES02AF	nd	nd	nd	nd	nd	nd	nd	0.000041	0.000075	nd	nd
EM01EC	nd	nd	nd	nd	0.00002	nd	nd	nd	0.000048	nd	nd

nd = non-detect

Appendix E. Di-*ortho* Planar PCB congeners, Tables E-1 through E-10.

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Table E-1. Di-*ortho* Planar PCB congeners in fillet samples of smallmouth bass from Meddybemps Lake.

Table E-2. Di-*ortho* Planar PCB congeners in fillet samples of smallmouth bass and brook trout from the Dennys River.

Table E-3. Di-*ortho* Planar PCB congeners in fillet samples of smallmouth bass from the East Machias River.

Table E-4. Di-*ortho* Planar PCB congeners in reconstructed wholebody smallmouth bass from Meddybemps Lake.

Table E-5. Di-*ortho* Planar PCB congeners in reconstructed wholebody smallmouth bass and brook trout from the Dennys River.

Table E-6. Di-*ortho* Planar PCB congeners in reconstructed wholebody smallmouth bass from the East Machias River.

Table E-7. Di-*ortho* Planar PCB congeners in wholebody samples of pumpkinseed from Meddybemps Lake.

Table E-8. Di-*ortho* Planar PCB congeners in wholebody samples of white sucker from the Dennys River.

Table E-9. Di-*ortho* Planar PCB congeners in wholebody samples of white sucker from the East Machias River.

Table E-10. Di-*ortho* Planar PCB congeners in freshwater mussel composite samples from Meddybemps Lake, the Dennys River, and East Machias River.

Table E-1. Di-*ortho* Planar PCB Congeners in **FILLET** Samples of Smallmouth Bass from Meddybemps Lake, ug/g WW.

Sample No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
Meddybemps Lake @ Eastern Surplus Site										
MS01SMF	0.000176	0.00365	0.000328	nd	0.00276	0.00594	0.00395	0.000032	0.000533	nd
MS02SMF	0.000058	0.00131	0.000091	nd	0.00155	0.00211	0.00154	nd	0.000257	nd
MS03SMF	0.000066	0.00148	0.0000048	nd	0.00186	0.00232	0.00144	nd	0.000243	nd
MS04SMF	0.000048	0.000991	0.000094	nd	0.00488	0.00162	0.00113	nd	0.000158	nd
MS05SMF	0.0000049	0.000462	0.0000049	nd	0.00172	0.00086	0.000517	nd	0.000078	nd
Mean	0.0000706	0.001579	0.0001045	nd	0.00255	0.00257	0.001715	nc	0.000254	nd
Meddybemps Lake @ Staples Cove (Lake Reference Site)										
SC01SMF	nd	0.000598	nd	nd	0.0007	0.000892	0.000531	nd	0.000116	nd
SC02SMF	nd	0.000401	0.000024	nd	0.0024	0.000511	0.000268	nd	0.000062	nd
SC03SMF	nd	0.000328	nd	nd	0.00231	0.000611	0.000347	nd	0.000104	nd
SC04SMF	nd	0.000159	nd	nd	0.00259	0.000275	0.000137	nd	0.000026	nd
SC05SMF	nd	0.000336	nd	nd	0.00277	0.000557	0.000292	nd	0.000066	nd
Mean	nd	0.000364	nc	nd	0.00215	0.000569	0.000315	nd	0.000075	nd
Meddybemps Lake @ Fowler Point										
FP01SMF	0.000027	0.000315	0.000024	nd	0.0014	0.000415	0.000189	nd	0.000038	nd
FP02SMF	0.000103	0.000861	0.000074	nd	0.00277	0.00138	0.000817	nd	0.000181	nd
FP03SMF	0.000117	0.00111	0.000104	nd	0.000786	0.00161	0.000839	nd	0.000166	0.000036
FP04SMF	0.000026	0.000312	0.000023	nd	0.00108	0.000426	0.000216	nd	0.000036	nd
FP05SMF	0.000042	0.000418	0.0000111	nd	0.00292	0.000574	0.000263	nd	0.000054	nd
Mean	0.000063	0.000603	0.000047	nd	0.001791	0.000881	0.000465	nd	0.000095	nc

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

Table E-2. Di-*ortho* Planar PCB Congeners in **FILLET** Samples of Smallmouth Bass and Brook Trout from the Dennys River, ug/g WW.

Sample No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
Dennys River @ Eastern Surplus Site										
ES01SMF	nd	0.00126	0.000012	nd	0.00355	0.00271	0.00156	nd	0.000217	nd
ES02SMF	nd	0.00632	0.00036	nd	0.00424	0.00841	0.0071	nd	0.00143	0.000101
ES03SMF	nd	0.00213	0.00023	nd	0.00133	0.00323	0.00232	0.000034	0.000469	nd
ES04SMF	0.000092	0.00113	0.00012	nd	0.0025	0.00188	0.00112	nd	0.000215	nd
ES05SMF	0.000118	0.00181	0.00019	nd	0.00202	0.00288	0.00192	0.000024	0.000412	0.000036
Mean	nc	0.00253	0.000182	nd	0.00273	0.00382	0.00280	nc	0.000549	nc
Dennys River @ Deadwater										
DW01SMF	0.000133	0.00359	0.0003320	nd	0.00443	0.00628	0.00304	0.000067	0.000426	0.000023
DW02SMF	0.000118	0.003	0.00000489	nd	0.00674	0.00549	0.0031	nd	0.000409	nd
DW03SMF	0.0000105	0.00124	0.000129	nd	0.00162	0.0019	0.00124	nd	0.000241	nd
DW04SMF	0.0000115	0.000748	0.000076	nd	0.00233	0.0012	0.000657	nd	0.00011	nd
DW05SMF	0.000128	0.00611	0.000714	nd	0.00471	0.00913	0.00709	0.000082	0.00135	0.000067
Mean	0.0000802	0.002938	0.000251	nd	0.00397	0.00480	0.003025	nc	0.000507	nc
Dennys River @ Dead Stream - Brook Trout										
DS01BTF	nd	0.00105	0.0000185	nd	0.000912	0.00188	0.000899	nd	0.000129	nd
DS02BTF	0.000071	0.00148	0.00021	nd	0.00153	0.00325	0.00222	nd	0.000373	nd
DS03BTF	nd	0.00105	0.000122	nd	0.000784	0.00205	0.000735	nd	0.000103	nd
DS04BTF	0.000231	0.00395	0.000478	nd	0.00257	0.00655	0.00496	0.000067	0.000982	0.000054
DS05BTF	nd	0.00285	0.000322	nd	0.00153	0.00499	0.00276	nd	0.000014	nd
Mean	nc	0.00208	0.000230	nd	0.001465	0.00374	0.002315	nc	0.000320	nc

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

Table E-3. Di-*ortho* Planar PCB Congeners in **FILLET** Samples of Smallmouth Bass from the East Machias River, ug/g WW.

Sample No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
EM01SMF	nd	0.000236	nd	nd	0.00125	0.000309	0.0001	nd	0.000037	nd
EM02SMF	nd	0.000329	nd	nd	0.000901	0.000485	0.000234	nd	0.000053	nd
EM03SMF	nd	0.000443	nd	nd	0.00094	0.000659	0.000185	nd	0.000028	nd
EM04SMF	nd	0.000753	nd	nd	0.00156	0.00111	0.000676	nd	nd	nd
EM05SMF	nd	0.000407	nd	nd	0.00112	0.000504	0.000212	nd	nd	nd
EM06SMF	nd	0.00053	nd	nd	0.00102	0.00106	0.000221	nd	nd	nd
Mean	nd	0.000450	nd	nd	0.001132	0.000688	0.000271	nd	nc	nd

nd = non-detect, nc = not calculated

Table E-4. Di-*ortho* Planar PCB Congeners in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from Meddybemps Lake, ug/g WW.

Fish No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
Meddybemps Lake @ Eastern Surplus Site										
MS01SM	0.000780649	0.013828378	0.001298162	nd	0.006838919	0.023012432	0.015339189	0.000138703	0.002051811	0.000170
MS02SM	0.000275485	0.004270206	0.000395327	nd	0.003105619	0.007101572	0.005527216	0.0000397	0.000954008	0.0000692
MS03SM	0.000447521	0.007435271	nd	nd	0.003985301	0.012046205	0.007904458	0.0000647	0.001273919	0.0001038
MS04SM	0.000534442	0.008316465	0.00083771	nd	0.005375314	0.014172871	0.009831254	0.0000878	0.001467993	0.0001351
MS05SM	0.000349152	0.004865975	0.00049769	nd	0.037064831	0.008424576	0.005641928	0.00013033	0.000869237	0.0000709
Mean	0.00047745	0.007743259	nc	nd	0.011273997	0.012951531	0.008848809	0.0000923	0.001323394	0.0001098
Meddybemps Lake @ Staples Cove (Lake Reference Site)										
SC01SM	0.0000270	0.001834923	0.000184609	nd	0.001069231	0.002523716	0.001645083	nd	0.00047174	0.0000447
SC02SM	0.000116662	0.002977089	0.0003284	nd	0.001976613	0.003984961	0.002649185	0.0000291	0.00068613	0.000109362
SC03SM	nd	0.001023104	0.0000975	nd	0.001661137	0.001751358	0.00112489	nd	0.000329237	nd
SC04SM	nd	0.001649937	0.000185053	nd	0.001714224	0.002390281	0.001664663	nd	0.000441287	0.0000360
SC05SM	0.0000702	0.002175716	0.000241086	nd	0.00183383	0.003027213	0.001914695	0.0000184	0.000497206	0.00010066
Mean	nc	0.001932154	0.000207324	nd	0.001651007	0.002735506	0.001799703	nc	0.00048512	nc
Meddybemps Lake @ Fowler Point										
FP01SM	0.000243772	0.001781801	0.000178544	nd	0.001290588	0.002606654	0.001256449	0.0000173	0.000334779	0.0000740
FP02SM	0.000129765	0.001120235	0.000105353	nd	0.001316294	0.001754706	0.001002824	nd	0.000254412	0.0000340
FP03SM	0.000370299	0.002823896	0.000291909	nd	0.001332519	0.003847013	0.002312675	0.0000242	0.000561779	0.00012961
FP04SM	0.000293077	0.002143385	0.000215132	nd	0.001338901	0.002895099	0.001676747	0.0000206	0.000384154	0.0000765
FP05SM	0.000481339	0.003871964	0.000411099	nd	0.002527336	0.005757168	0.00335023	0.0000562	0.00080673	0.00016661
Mean	0.00030365	0.002348256	0.000240407	nd	0.001561128	0.003372128	0.001919785	nc	0.000468371	0.0000962

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

Table E-5. Di-*ortho* Planar PCB Congeners in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass and Brook Trout from the Dennys River, ug/g WW.

Fish No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
Dennys River @ Eastern Surplus Site										
ES01SM	0.00029093	0.008718344	0.000912459	nd	0.004808217	0.014450828	0.008790955	0.000106745	0.001629083	0.000114325
ES02SM	0.000665409	0.025029943	0.001764343	nd	0.011598171	0.034002686	0.025605143	0.00023606	0.005277314	0.000337251
ES03SM	0.000118069	0.004407233	0.000449145	nd	0.002492013	0.006521069	0.004659623	0.0000168	0.000961101	0.0000440
ES04SM	0.00012019	0.004215714	0.000433905	nd	0.002865714	0.006375238	0.00432	nd	0.000980714	0.0000514
ES05SM	0.000381545	0.004901591	0.000591834	nd	0.002968474	0.007759935	0.004721981	0.0000798	0.000968052	0.0000954
Mean	0.000315229	0.009454565	0.000830337	nd	0.004946518	0.013821951	0.00961954	nc	0.001963253	0.0001285
Dennys River @ Deadwater										
DW01SM	0.00013745	0.003064878	0.0000409	nd	0.003531062	0.005256457	0.002701786	0.0000697	0.000377938	0.0000069
DW02SM	0.000174127	0.004411667	0.000432736	nd	0.004222811	0.007811596	0.004171506	0.0000917	0.000625852	0.0000313
DW03SM	0.000422524	0.007873846	0.000914548	nd	0.004670385	0.012857692	0.008244038	0.000113784	0.001809875	0.000135995
DW04SM	0.000190389	0.003416148	0.000364148	nd	0.002633704	0.005288889	0.003303667	0.0000208	0.000741852	0.0000748
DW05SM	0.001249418	0.027226962	0.003014962	nd	0.015832025	0.044480886	0.035947722	0.000593089	0.006652278	0.000463253
Mean	0.000434782	0.0091987	0.000953459	nd	0.006177997	0.015139104	0.010873744	0.000177806	0.002041559	0.000142456
Dennys River @ Dead Stream - Brook Trout										
DS01BT	nd	0.001481489	0.000122431	nd	0.001521064	0.002639255	0.001281117	nd	0.000192894	nd
DS02BT	0.0000498	0.002224059	0.000126906	nd	0.002095842	0.004858416	0.003529901	nd	0.000633198	nd
DS03BT	nd	0.001082989	0.0000735	nd	0.000854218	0.001993448	0.000763276	nd	0.000109598	nd
DS04BT	0.000232942	0.005508252	0.000590621	nd	0.004356408	0.00905	0.006314369	0.0000825	0.001087825	0.0000559
DS05BT	0.0000953	0.003627938	0.000466979	nd	0.003732474	0.006298351	0.003709691	nd	0.000330732	nd
Mean	nc	0.002784945	0.000276077	nd	0.002512001	0.004967894	0.003119671	nc	0.000470849	nc

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

Table E-6. Di-*ortho* Planar PCB Congeners in **RECONSTRUCTED WHOLEBODY** Smallmouth Bass from the East Machias River, ug/g WW.

Fish No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
EM01SM	0.0000513	0.001141767	0.000128495	nd	0.000918437	0.001674544	0.000636291	nd	0.000181757	nd
EM02SM	0.000101857	0.0014008	0.000134057	nd	0.001097486	0.002019429	0.000947657	nd	0.000221229	0.0000335
EM03SM	0.000336889	0.003938458	0.000391645	nd	0.001439644	0.005532929	0.001831089	0.0000193	0.000422924	0.0000528
EM04SM	0.000203289	0.002890705	0.000283184	nd	0.001629474	0.004368316	0.001776463	0.0000213	0.000395037	0.0000456
EM05SM	0.00015912	0.002012197	0.000163213	nd	0.001051781	0.002656997	0.000947403	nd	0.000199369	nd
EM06SM	0.0000936	0.003071885	0.000244644	nd	0.001284092	0.004295126	0.00155714	nd	0.000358533	nd
Mean	0.0001577	0.002409302	0.000224206	nd	0.001236819	0.003424557	0.001282674	nc	0.000296475	nc

nd = non-detect, nc = not calculated

Shaded values indicate a non-detect in the fillet or carcass portion. One-half the sample detection limit was used in the reconstruction.

Table E-7. Di-*ortho* Planar PCB Congeners in **WHOLEBODY** Pumpkinseed from Meddybemps Lake, ug/g WW.

Sample No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
Meddybemps Lake @ Eastern Surplus Site										
MS06PSW	0.000118	0.00201	0.000151	nd	0.00145	0.00308	0.0016	nd	0.000224	nd
MS07PSW	0.00008	0.00145	0.000114	nd	0.00113	0.00243	0.00169	nd	0.000267	nd
MS08PSW	0.000087	0.00141	0.0001	nd	0.000789	0.00211	0.00187	nd	0.000197	nd
MS09PSW	0.000061	0.000912	0.0000048	nd	0.00106	0.00152	0.000954	nd	0.000159	nd
MS10PSW	0.0000049	0.000539	0.0000049	nd	0.00116	0.0009	0.000541	nd	0.000115	nd
Mean	0.0000702	0.0012642	0.0000749	nd	0.001118	0.00201	0.001331	nd	0.000192	nd
Meddybemps Lake @ Staples Cove (Lake Reference Site)										
SC06PSW	nd	0.00143	0.000076	nd	0.00099	0.00235	0.00128	nd	0.000396	0.000057
SC07PSW	nd	0.000403	nd	nd	0.000469	0.000716	0.000209	nd	0.000056	nd
SC08PSW	nd	0.000584	nd	nd	0.000774	0.000867	0.000477	nd	0.000096	nd
SC09PSW	nd	0.000467	nd	nd	0.000462	0.000635	0.000245	nd	0.000066	nd
SC10PSW	nd	0.000483	nd	nd	0.000469	0.000775	0.000306	nd	0.000086	nd
Mean	nd	0.000673	nc	nd	0.000633	0.001069	0.000503	nd	0.00014	nc
Meddybemps Lake @ Fowler Point										
FP06PSW	0.000031	0.000442	nd	nd	0.00125	0.000842	0.000279	nd	0.0000047	nd
FP07PSW	nd	0.00058	nd	nd	0.000925	0.000919	0.000293	nd	0.000051	nd
FP08PSW	nd	0.000324	nd	nd	0.00222	0.000503	0.000179	nd	0.000028	nd
FP09PSW	nd	0.000357	nd	nd	0.00103	0.000569	0.000368	nd	0.0000046	nd
FP10PSW	0.000049	0.000517	nd	nd	0.000469	0.000807	0.000405	nd	0.000044	nd
Mean	nc	0.000444	nd	nd	0.0011788	0.000728	0.000305	nd	0.0000265	nd

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

Table E-8. Di-*ortho* Planar PCB Congeners in **WHOLEBODY** White Sucker from the Dennys River, ug/g WW.

Sample No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
Dennys River @ Eastern Surplus Site										
ES06WSW	0.00025	0.00376	0.000441	nd	0.00208	0.0059	0.00357	0.000052	0.000707	0.000048
ES07WSW	0.000208	0.00303	0.000338	nd	0.00207	0.00522	0.00359	0.000049	0.00073	0.000044
ES08WSW	0.000325	0.00443	0.000501	nd	0.00314	0.0071	0.00538	0.000089	0.00112	0.000075
ES09WSW	0.000638	0.00812	0.00102	nd	0.00515	0.0131	0.00975	0.000158	0.00211	0.000144
ES10WSW	0.000527	0.0068	0.000794	nd	0.00445	0.011	0.0083	0.000139	0.00176	0.000133
Mean	0.0003896	0.005228	0.0006188	nd	0.003378	0.008464	0.006118	0.0000974	0.0012854	0.0000888
Dennys River @ Deadwater										
DW06WSW	0.000125	0.00334	0.000331	nd	0.00185	0.0055	0.00333	0.00001	0.000586	0.00002
DW07WSW	0.000157	0.00396	0.000454	nd	0.00235	0.00654	0.00413	0.000055	0.00078	0.000046
DW08WSW	0.000431	0.0095	0.00112	nd	0.00587	0.015	0.0118	0.000174	0.00241	0.000139
DW09WSW	0.000348	0.00876	0.00105	nd	0.00575	0.0138	0.0113	0.000164	0.00238	0.000159
DW10WSW	0.000033	0.00182	0.00018	nd	0.00111	0.00308	0.00179	0.000018	0.00031	0.000017
Mean	0.0002188	0.005476	0.000627	nd	0.003386	0.008784	0.00647	0.0000842	0.0012932	0.0000762
Dennys River @ Dead Stream										
DS06WSW	0.000138	0.003	0.0000050	nd	0.00342	0.00513	0.00266	0.00007	0.000372	nd
DS07WSW	0.000133	0.00359	0.000332	nd	0.00443	0.00628	0.00304	0.000067	0.000426	0.000023
DS08WSW	0.000184	0.00466	0.000508	nd	0.00378	0.00822	0.00436	0.000107	0.000664	0.000036
DS09WSW	0.000118	0.003	0.0000049	nd	0.00674	0.00549	0.0031	0.0000049	0.000409	nd
DS10WSW	0.000126	0.0015	0.000218	nd	0.0000105	0.00281	0.00131	0.0000105	0.000166	nd
Mean	0.0001398	0.00315	0.0002136	nd	0.0036761	0.005586	0.002894	0.0000519	0.0004074	nc

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the sample detection limit.

Table E-9. Di-*ortho* Planar PCB Congeners in **WHOLEBODY** White Sucker from the East Machias River, *u* g/g WW.

Sample No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
EM06WSW	0.000317	0.000865	nd	nd	0.002660	0.00112	0.000915	nd	nd	nd
EM07WSW	nd	0.0000123	nd	nd	0.000929	0.000094	0.0000123	nd	nd	nd
EM08WSW	nd	0.000312	nd	nd	0.000756	0.000238	0.000114	nd	nd	nd
EM09WSW	nd	0.000370	nd	nd	0.000617	0.000458	0.000188	nd	0.000048	nd
EM10WSW	nd	0.002800	nd	nd	0.002560	0.00179	0.00158	nd	nd	nd
Mean	nc	0.00087186	nd	nd	0.001504	0.00074	0.00056186	nd	nc	nd

nd = non-detect, nc = not calculated

Shaded cells represent non-detects. Values listed are one-half the detection limit.

Table E-10. Di-*ortho* Planar PCB Congeners in **MUSSEL COMPOSITE** Samples from Meddybemps Lake, the Dennys River, and East Machias River, *u* g/g WW

Sample No.	Di-*ortho* PCBs									
	PCB# 128	PCB# 138	PCB# 158	PCB# 166	PCB# 170	PCB# 153	PCB# 180	PCB# 191	PCB# 194	PCB# 205
MS01AF	0.000013	0.000242	0.00002	nd	0.000445	0.000427	0.000359	nd	0.000067	nd
SC01EC	nd	0.000058	nd	nd	0.000469	0.000065	0.000034	nd	nd	nd
FP01EC	nd	0.000124	nd	nd	0.000647	0.000124	0.000124	nd	nd	nd
ES01AF	nd	0.000466	nd	nd	0.000765	0.000693	0.000685	nd	0.000111	nd
ES02AF	nd	0.000881	0.000079	nd	0.001200	0.00145	0.00133	nd	0.000268	nd
EM01EC	nd	0.000115	nd	nd	0.000828	0.000099	0.000052	nd	0.00002	nd

nd = non-detect